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JANUARY, 1938

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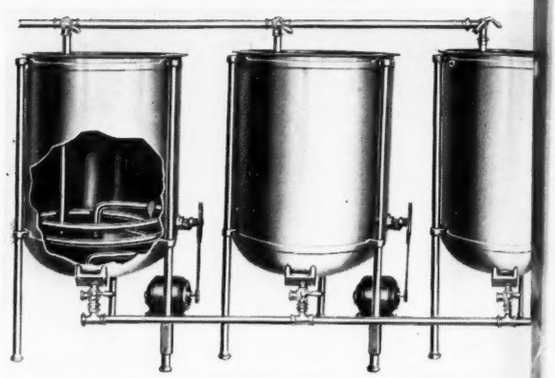

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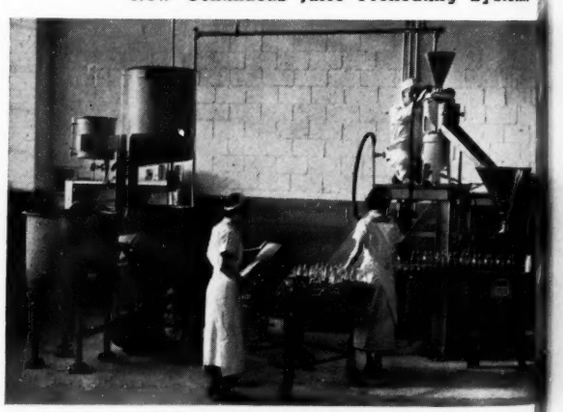

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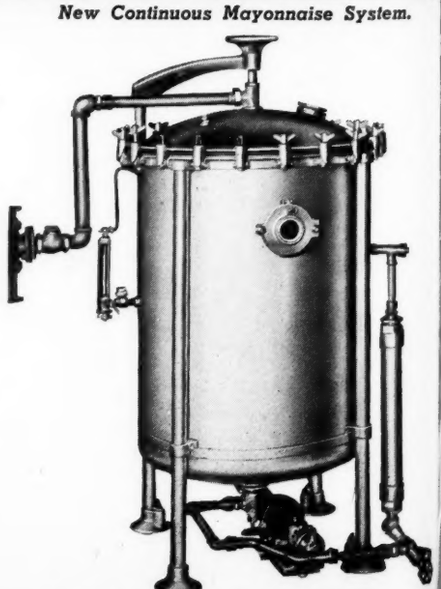

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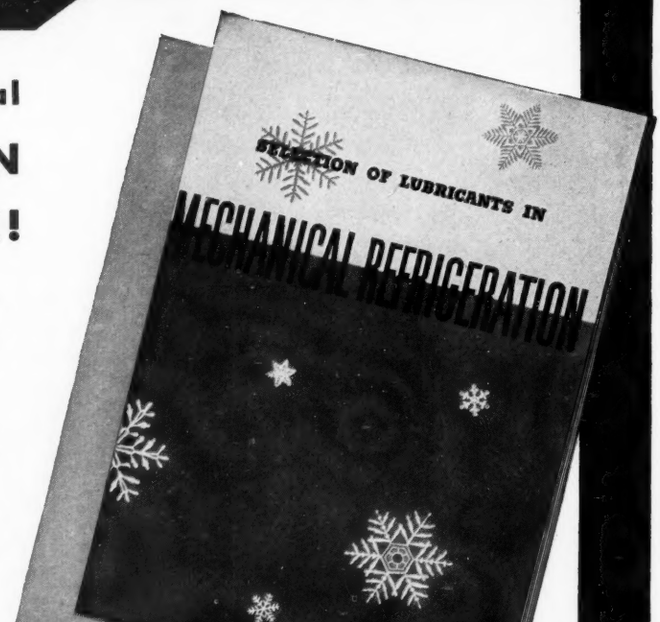

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FOOD INDUSTRIES

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Established 1928—McGraw-Hill Publishing Company, Inc.

Vol. 10, No. 1

Laurence V. Burton, Editor

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JANUARY 1938

The Talk of the Industry

» RELIABLE INFORMATION has it that if you hear of any serious earthquakes in California during the next few months they will have been caused by Mr. Hoover laughing.

» IF THE 40—40 HOUR-WAGE BILL ever becomes law, it looks as if more second rate employees will lose jobs than will gain jobs. As usual, the uplifters' efforts to help the unfortunates of life will do exactly the opposite.

» IN A LARGE CITY, the liquor dealers recently staged a price war which became front-page news in most of the local dailies. Quite a contrast, that, to their attitude toward price wars where nationally advertised brands of foods are concerned. In such cases, the dailies are usually eloquently silent.

The reason for the differing newspaper reaction appears to lie in the fact that liquor is purchased largely by the men folks, whereas foods are still purchased mainly by their wives.

» AN IMPORTANT DIFFERENCE between buying habits of men and women is that a woman will buy something she does not want just because it is cheap. On the other hand, a man will pay double value for something he wants.

» SOCIAL SECURITY TAXES are now beginning to roll into the Federal treasury. If the Administration depends upon this revenue for balancing the budget, what will be the reserve from which benefits will ultimately be paid?

» WHERE ONE'S CHILDHOOD FRIENDS finally end up, is ever a matter of wonder, especially when one of them is doing time in the Big House and another becomes chairman of the National Labor Relations Board. And speaking of N.L.R.B., we see by the papers that the editor of our neighbor, *Mill & Factory,* has been ordered (quaint word) to appear before the board and tell all he knows about a certain C.I.O. "election" which he ridiculed. Who would ever have guessed that quiet, studious, unsmiling J. Warren Madden would bust out in that manner?

» EXECUTION OF RUSSIAN FOOD TRUST EMPLOYEES because they allowed the grain in storage under their care to become infested with weevils seems to be a pretty high price to pay for ignorance and lack of fumigation facilities. Promotion to a place of responsibility under any form of economy always carries with it a burden of grief and worry, but under a Communistic regime it also carries with it a potential death sentence if any mishaps occur.

» ENFORCEMENT OF THE SANITARY REQUIREMENT to avoid exposing bread where housewives can squeeze the unprotected loaves caused a small baker to protest that his business would be ruined. The health department inspectors were stony hearted. Yet today he is making more money than ever. Reason: Nobody can steal his bread any more, and the shop lifters are now paying cash.

» FOR SOME INEXPLICABLE REASON there is a growing demand for year-end statements and forecasts of the year to come. If any one would really tell what he himself intended to do, with the means at his disposal, in the coming year these statements might have some value. But, when they are merely a guess about what somebody else—or everybody else—is going to do, they are not particularly informing.

» JUST WHY the daily newspapers should be so insistent on obtaining our own views is another perplexity of life. Time was when they would ask for a statement along about Dec. 20. Then they moved the deadline successively forward until, in 1937, the requests began to come in about Nov. 15. Which will account for the appearance of this department's crystal-gazing statement in December 1937 FOOD INDUSTRIES.

» SOMEONE has sent in a new price list of new "health foods"—a list which contains a number of interesting, even if not very alluring, suggestions. For instance, a dollar will bring you a trial order of 40 capsules of a combination of potato peel, okra, and parsley. This is stated to be "a remedy for those suffering from gas, gastric ulcers, intestinal weakness and malnutrition due to sluggishness and food intoxication."

The most intriguing part of this

promotion piece is its positive distum that "you can't be successful eating graveyard foods" or, that the wife of the man who is "sodium hungry . . . may cook his food so that there is nothing left in it but dead carbons, proteins and ghost paste."

Ghost paste has us all excited. Is it by any chance a new name for bread pudding?

Wages and Hours Legislation

IF THE DOPE IS CORRECT, a wages-and-hours bill may possibly be passed in the regular session of Congress in 1938. In which case there will still be time for food manufacturers to protect their interests through their representatives in Congress.

Food manufacturers, especially those in the seasonal group, will be sorely pressed if the 40 hour-40 cent week is imposed by federal law. Too frequently, adverse weather precludes a 40-hour operation and in other cases there is not enough help available for double shifts. Certain common sense exemptions are needed.

Opportunity to Sell More

THOSE WHO NEED to find some way to boost their sales volume should carefully and regularly watch the pages in each issue of FOOD INDUSTRIES that are devoted to the new way to increase impulse sales. This method is the use of the food pages from women's magazines as the central feature of a window display of related food items, to be used while the magazines are current.

FOOD INDUSTRIES has tested the method sufficiently to know how well it works. We have demonstrated huge volume increases, sometimes as high as 1100 per cent! If your job is to sell we offer you in each issue a method that has a productive life of at least a month.

The Real Low Down on a Strike

DOWN IN HERSHEY, PA., last month we chanced to talk to a chap who was a neighbor of Mr. Fred Loy, who, it will be recalled, organized the sit-down strike at Hershey Chocolate Corp. It seems that after the farmers ousted the sit-downers, and incidentally roughed up Mr. Loy a bit, the neighborhood boys started tormenting Loy's son. Kids have a way of doing just that.

"Your dad got licked, got licked, got licked," they jeered. Whereat the Loy boy promptly spilled the beans:

"Whatya picking on me for? Can I help it if Dad tried to get rich quick an' missed it?"

Why the Secrecy?

BOTH N.A.M. and A.G.M.A. held closed sessions recently during their conventions from which all but members were excluded so that the boys could speak freely and fully, if they chose. Yet apparently they did not choose to do so—or at least nobody said a great deal that could be regarded as highly spectacular, inside stuff.

To close these sessions to the daily press and to the public does not appear to be a very sound policy. International Association of Milk Dealers has followed the closed-door policy for years. And now, please note, how avidly the daily press does *not* champion the cause of the harrassed milk distributor when the brick-bats are flying from all sides.

Interesting Equipment for Food Processors

THE EXPOSITION of Chemical Industries has come and gone, and more than ever before the exhibition has partaken of a display of food processing equipment. To give an adequate picture of the interesting exhibits is impossible because of the limitations of human endurance. If it were possible for editors to confine their investigations only to the new equipment to perform a single unit operation, which perchance needs pepping up as was recommended in December F.I., the task would not be arduous. As it is, there is no doubt that we missed more than we saw.

Outstanding of the ideas and equipment on display is the trend toward converting batch processes into continuous operations, and the further development of continuous operation with many refinements, even to the extent of continuous weighing of a moving load on a conveyor.

Most spectacular from the food standpoint is the news emanating from one equipment maker that it is now possible to produce chocolate liquor from raw beans by a single passage through a suitable piece of grinding

Hors d'Oeuvres

• The people in the South are said to look upon the proposed wages-and-hours legislation as a Northern effort to check industrial expansion in that section. Which not only means that we have a new Civil War issue but that the President's hopes for early passage of a wages-and-hours bill are gone with the wind.

• *At Nashville Agricultural Normal Institute, scientists are making milk, meat, coffee and automobile accessories from the soy bean. Which, to say the least, is using the bean effectively.*

• Colchicine, an alkaloid with a structure related to that of the hormones that control sex characteristics in man and beast, will induce doubling in the number of chromosomes of a plant treated with it, producing an acceleration in evolution, it has been discovered If this monkey business with chromosomes doesn't stop, the food manufacturer will find himself with something new and different in the way of raw materials.

• *A dairy company has gone into the cosmetic business. The product, which is concentrated and vitaminized dairy cream, is intended to be used not in the bath a la Cleopatra, but as a cleanser, night cream, powder base, beauty pack or hand cream. The most interesting thing about it is that a 4-oz. jar sells for $1.*

• Consumption of sausage was prohibited by imperial decree when Constantine the Great became emperor of Rome. But the prohibition was repealed when it was discovered that the people satisfied their craving for the product by patronizing bootleggers.

• *Flour mills that float on the tide operate on the Danube River in Roumania. Anchoring where the current is swift, the mills utilize the energy of old man river to turn the wheel that grinds the grain.*

• Chocolate beer cake is a new specialty being promoted by bakers, apparently for the purpose of making sales hop. We wish them luck, but if they want to put beer into something, it would go better in pretzels.

• *Animals fed chemical food in capsule form will be displayed at San Francisco's 1939 Golden Gate International Exposition, the idea being to show what is in store for humans. Enjoyment of eating is a basic human pleasure, and there is only one idea crazier than taking food as pills—getting babies out of test tubes.*

• From Central America has been brought a plant whose juice will preserve meat. It is called plant de la carne (plant of the meat). The stalk and leaves are ground up to yield a liquor which is said to kill bacteria without imparting any flavor to meat. It is reported to keep meat fresh in the tropic for four to six weeks. Maybe that's what the ancients used for embalming fluid.

equipment. Here the heat of grinding does most of the roasting. Unless somebody has been indulging in unwarranted romancing, this one new development will have far-reaching effects, especially for users of chocolate products.

In the field of fluids handling, the newest thing seems to be the further development of adjustable proportioning pumps to an extent that is highly gratifying to the production man.

During the next few months various items of new equipment that were shown will be described in the appropriate department of FOOD INDUSTRIES.

Packaging Entries for the Wolf Award

THOSE CONCERNS which have created new packages or restyled old ones and have actually put them into production in 1937 are urged to enter them in the Wolf Award Competition for the best packaging jobs of the year. There are twenty classifications. Write at once to the Irwin D. Wolf Awards Administration, 232 Madison Ave., New York, for your entry blanks and information. Entries are closed after Feb. 9, 1938.

1938 Packaging Conference

THIS YEAR the Packaging Conference of the American Management Association is to be held between March 22 and March 25 at the Palmer House in Chicago instead of in New York.

Two important features of the program are the bulk packaging session and the machinery session. In the latter, the equipment manufacturers and their customers are likely to be delightfully frank.

You will find it worth your time and money to attend every session.

Proper Illumination Pays

ADEQUATE LIGHTING for workers is a very important feature of well-operated plants. In most plants, nevertheless, the choice of lampsize and fixture is a matter of guess work. And usually such guesses are 'way on the low side. With the new photometers now available, it is easy to measure the amount of illumination at any selected point, and the efficiency of an operation can thus be compared with the amount of illumination.

A study of lighting requirements has been made in beverage plants, and the results are presented elsewhere in this issue. To one who has had no experience in accurate measurement of illumination the recommended amount of lighting may seem surprisingly large. Yet we have never seen too much light in any factory. Our own past experience in running plants, where there was nobody else to say "nay" on the light question, amply substantiates the desirability of plenty of light. It works for good in two ways: greater efficiency of workers and a more cheerful morale. Bright light and good feeling go hand in hand.

Though the standards of good illumination are now available whereby one can know what he ought to have, not every one realizes that two other points must be considered in order to have adequate illumination. First of all there must be clean light bulbs of proper size and enough of them. Under this head comes also the matter of proper reflectors and fixtures and the bulbs must not be old and blackened. That much is readily understandable by anyone.

The second point is that the wiring must be adequate. Too often the wires are too small to carry the current without a considerable loss of voltage and consequent poor performance by electric lights. Nothing is really gained in illumination by putting more lamps on an overloaded circuit. Old plants are almost certain to be inadequately wired and the voltage losses in too small wires is sometimes amazing. The ideal procedure is to call in an expert from a local utility company for an analysis of the losses. But there are other tell-tale indicators of voltage losses, such as a modern portable electric drill. If the drill is in good condition and yet will not drill steel fast enough to turn out chips too hot to touch—or if the point does not heat considerably—then the wires on the circuit are too small. Another tell-tale is insulated wires that get warm to the touch even though the fuse does not blow out.

Only by having adequate wiring and adequate bulbs is it possible to have adequate illumination. But adequate illumination pays dividends.

What of Your Wastes?

LEGISLATION, now in the making in Washington, gives new importance to waste-disposal problems. Uncle Sam is going to take a hand in the control of stream pollution. Every food plant of the future must be planned with greater care to provide for its own adequate liquid-waste control. And present plants must be restudied, if they are currently discharging wastes into nearby streams either directly or through local sewer systems.

A conference committee in Congress is trying to reconcile a research and development program, proposed by the House of Representatives, with a much more vigorous Federal control plan proposed in the Senate. The result cannot be foreseen at this writing. But the legislative result, as it will appear shortly in an Act of Congress, is much less important than the broad principle which is certain to govern the situation as soon as the Public Health Service officials get busy on their stream-pollution studies.

Certain liquid wastes from food plants are necessary. Others represent losses in recoverable marketable value. The former type will have to be reduced to a minimum and the discharge rendered harmless from the stream-pollution point of view. The latter ought to be saved, regardless of law, for the benefit of the stockholder.

Food plants generally can expect to gain more than they will loose from this new compulsion for care in waste disposal. An important result will be better water supplies from the nation's streams. It is to be hoped—indeed, to be expected—that this benefit, added to the byproduct income from recovered wastes, will more than pay the bill which stream-pollution legislation is going to impose. But whether it does or not, the subject can no longer be safely neglected by any food-plant management.

Signs of the Times

THE CHOICE of Colby M. Chester, chairman of General Foods Corp., to make the closing speech before the convention of the National Association of Manufacturers is significant of a trend. The N.A.M. is composed of members representing all sorts of industries which, for the sake of this comment, may be divided into capital-goods industries and consumer-goods industries.

For several years, the consumer-goods manufacturers in N.A.M. have been somewhat at variance with the capital-goods group over association policy. The consumer-goods crowd, with much closer contact with the public, have a background of experience that is now being drawn upon.

The choice of Mr. Chester as the spokesman is a particularly happy one—not so much because he is a food manufacturer but because, through long experience, he understands the proper relation of the manufacturer and the public. May his type of thinking pervade and inspire all manufacturing industries!

Needed—
A NEW Law

The food industries should press vigorously for enactment of an adequate food and drug law

A problem in labeling worries W. G. Campbell, chief of the Food and Drug Administration, and Senator Royal S. Copeland, long the champion of a new food and drug law.

FOOD MANUFACTURERS have lately suffered a number of indignities from within their own industry groups. Marketing of substandard goods has continued to plague the preservers. Teaseed oil has given the olive-oil distributors and users many uncomfortable hours. A careless cyanide fumigation effort in California produced an alarming setback for one division of the dried fruit industry. Metal contamination has again risen to plague a wide variety of food processors, those making dried apples, packing sardines, handling maple products and others whose affairs seem extremely remote from the possibility of lead or arsenic troubles.

All these difficulties in the last analysis come back to the necessity for the compliance with food laws, quality standards and those fair trade practices essential for decent business relationships among competitors. They again demonstrate the need for a clearer definition of authority in the Food and Drug Administration, and for a more prompt intelligent enforcement of the law by the Department of Justice. Mere passage of S.5 in any of its forms now pending in Congress is not quite enough. Food manufacturers should ask for even further consideration of these matters along certain new lines.

Perhaps most important of the added regulations seeming to need legislative consideration is the possibility that the Department of Agriculture itself should be given the authority to prosecute its own cases in the courts, or at least to participate actively in all prosecution when it so desires. At present, the Food and Drug Administration prepares the technical material for prosecution. The solicitor of the Department advises regarding legal matters. But only the Department of Justice can bring suit or prosecute through the district attorneys in the areas where cases should be handled.

Often those cases of great industrial importance, which have been prepared with great care by Food and Drug officials, must be handled by local district attorneys inadequately experienced or far too busy to give proper attention to them. Even political or local factors occasionally seem to govern instead of law and industrial justice. The loss of such a case by the government not only discourages further technical efficiency, it becomes actually a threat against reputable business in those industries affected. Note one important example:

Currently, the preservers are experiencing difficulty with competition of misbranded preserves. One manufacturer has been charged with a very large number of offenses based on substandard quality of product, and he has been convicted on more than a score of counts. Further government investigations have indicated a continuance of the illegal practices. But prosecution by the Department of Justice has been slow, and the industry association is demanding "a different attitude on the part of prosecutors."

AT TIMES, division of responsibility between the departments of agriculture and justice has seemed to afford a desirable check on the overzealous enforcement against technical violators who appear both willing and able to eliminate further objectionable practices. But such is not the case here, so the preservers say. The Department of Justice has in these cases been unable or unwilling to carry through its prosecutions, and the industry is unquestionably the greatest sufferer.

Food manufacturers can well restudy this whole question, in order to determine whether they should not themselves demand of Congress prompt enactment of the long delayed Copeland food and drug bill. One of the great advantages to be gained from such law will be the authorization of the Department of Agriculture to fix standards of identity which can then be recognized in the courts. Among the new questions to be considered is this one of how adequate legal action for enforcement against wilful violaters can best be ensured.

To be sure, there are a few minor points about Committee Print No. 3 of S.5 that still give concern to those food manufacturers who are interested in maintaining their proprietary names. Clause (2) of Section 403 *g*, taken together with Section 401, appears to give the Secretary of Agriculture unlimited authority to specify the names under which items of food may be sold in interstate commerce. Thus names such as "Jello," "Grape Nuts," "Orange-Crush," "Cream of Wheat," "Nucoa" and "Klim" are conceivably in jeopardy should a future Secretary of Agriculture decide to exert his ideas against the use of proprietary names.

Such minor points should be cleared up by positive aggressive action by the food industries. And at the same time they should press vigorously for the enactment of the law.

Much is to be gained by a new food law, particularly in the present period when economic conditions may tempt the uninformed or unwise to cut corners in a reprehensible manner.

What Will the WEATHER BE?

Here is the data by which you can test the 23-year weather-cycle theory

EXACTLY A YEAR AGO, under the same title, was published a summary of 1914 weather so that each reader could judge for himself as to the usefulness of the theory of 23-year weather cycles. This theory, proposed by Dr. Charles G. Abbot, Secretary of the Smithsonian Institution, Washington, D. C., is that the general weather pattern repeats itself every 23 years.

Get out your January, 1937, copy of FOOD INDUSTRIES and read, on page 10, the 1914 summary and see whether it approximated what you can recall of 1937 weather. You will find that it missed badly on the heavy winter rains that caused the Ohio River flood. But what about the rest of the year? Especially the crop growing season? Don't try to judge it by weather in your own home town. Judge it by large regions.

It looks as if 1938 would be a severe test of the 23-year cycle theory, for 1915 was a rather unusual year. In the spring of 1915, one became aware of the origin of the old farmers' saying, "A cold wet May means a barnful of hay." In June of 1915, a wit was overheard to remark, "The chap who wrote the poem, 'Knee Deep in June,' must have had his boots on." From which you can surmise that there was quite a long, rainy spell in the spring of that year, especially in the central part of the country.

Records of the U.S. Weather Bureau also bear out the memory of that period. Will it be repeated in 1938? Will 1938 have a cold wet spring and a cold wet early summer? You will be interested in watching the weather as it develops.

Again, it is to be urged, one should maintain an attitude of healthy skepticism. Theories are to be tested—not to be swallowed whole. In the field of the physical sciences, theories can be tested by experiments. But one cannot experiment on a world-size scale. So one must use the other method of testing a theory, namely the ability of the theory to predict accurately what will occur in the future.

In all fairness, it should be stated that the U.S. Weather Bureau does not seem to be very much sold on the 23-year cyclical theory. Yet because of the vital interest the food industries have in the general pattern of the weather in the growing season, the weather of 1915 and 1916 is reviewed so that each one can observe and decide for himself what value it may have as a forecast for 1938 and 1939.

It seems unlikely, however, that the hypothetical cycle should be exactly 23.00 years in length. From what is known, it seems more likely that it would be *about* 23 years in length—perhaps 22.8 or 23.4. Probably a leeway of several months should be considered as permissible. Thus, if the cycle were slightly shorter than 23 years, the cold wet spell might occur in winter and spring, and in this case it would mean lots of snow. Or, if the cycle turned out to be a trifle longer than 23 years, it might mean that the cold wet spell might be postponed and occur in summer and autumn, or in autumn and winter.

THE WEATHER OF 1915

Prepared from U. S. Weather Bureau records

JANUARY.—Averaged warmer than normal over the Atlantic States, the Great Plains and the Pacific Coast. Cooler than normal over the Ohio and lower Mississippi valleys and the Great Basin. Precipitation above normal east of the Great Plains, heavy over Atlantic and East Gulf coasts. Precipitation below normal in the Great Plains.

FEBRUARY.—Generally warm in all sections, except extreme Southwest and Southeast. Precipitation heavy on central Gulf and Pacific coasts and generally above normal, except in northern Great Plains. Moderate flood in Ohio Valley.

MARCH.—Generally continuously cold in the Southeast and below normal from southern Rocky Mountains and central and southern Great Plains eastward. Precipitation generally light over entire country, and parts of New England reported the least March precipitation of record. No floods.

APRIL.—Temperature averaged above normal in all sections, except along southern border. Precipitation heavy in Texas and parts of New Mexico and Oklahoma and central Great Plains; elsewhere light. Floods in Southwest.

MAY.—Copious precipitation over large parts of all crop-producing sections. Rainfall unusually heavy in parts of the central valleys and south Atlantic and Gulf states. Month cold, except in the South Atlantic and Gulf states.

JUNE.—Generally cool and rainy, especially over the Great Plains and adjacent sections.

JULY.—Temperatures continuously low, and heavy to excessive rainfall from the Great Plains eastward.

AUGUST.—Continuously low temperatures from the Rocky Mountains to New England, except the Southeast and Pacific Coast sections were warm. Rainfall heavy from eastern Texas northward over the central valleys, also in parts of the Northeast and Southeast.

SEPTEMBER.—Warm in eastern half, but low temperatures in the Northwest. Rainfall adequate from the central Great Plains eastward, except in parts of the central Gulf area and the Northeast. Only local frosts.

OCTOBER.—Severely cold early in month with damage in western part of the corn belt; otherwise generally warm over entire country. Precipitation was light west of the Mississippi River, but was heavy in the Southeast.

NOVEMBER.—Generally mild and favorable for agriculture. Precipitation generally light, especially in the Great Plains, but was locally heavy in Ohio and lower Mississippi valleys.

DECEMBER.—Stormy over the Northeastern States, but temperatures generally above normal over much of the country west of the Mississippi River. Precipitation heavy on Pacific Coast and in Ohio and lower Mississippi valley areas; generally light elsewhere.

SUMMARY.—Mild first two months, but cool from March through August. Precipitation generally adequate in practically all sections. Frosts generally delayed until October.

THE WEATHER OF 1916

Prepared from U. S. Weather Bureau records

JANUARY.—Not much snow. Generally warm east of the Great Plains and in Southwest; cool in Northwest. Precipitation heavy on Pacific Coast and in central and lower Ohio and Mississippi valleys; light falls west of Great Plains.

FEBRUARY.—Warm to west of Great Plains and cool in most of East. Precipitation very light in Rocky Mountains and Great Plains; heavy falls in extreme Northwest and Northeast.

MARCH.—Warm from Mississippi valley westward; cool in East. Precipitation generally moderate, except heavy on north Pacific coast and light in Great Plains and Rocky Mountains.

APRIL.—Warm west of Rockies, in Great Lakes, Northeast and Southeast; cool elsewhere. Locally heavy precipitation in Texas and adjoining sections to Northeast, the north Pacific Coast, and parts of the Northeast.

MAY.—Warm in Southeast, but cool in Northwest. Rainfall spotted; heavy in lower Mississippi valley and locally elsewhere; not much rain in Southwest. Floods in Mississippi River April to June.

JUNE.—Generally cool, except the Southwest and parts of the Southeast. Ranfall spotted; heavy in lower Great Plains and moderate from Great Plains eastward.

JULY.—Warm in central, cool elsewhere. Rainfall excessively heavy in Southeast, light in central. Record-breaking heat in interior. Severe drought Kansas, Oklahoma, Missouri and adjacent sections. Severe floods Southeast.

AUGUST.—Warm east of Great Plains, cool west. Rainfall spotted. Continuously hot in interior first half. Unusually dry in Oklahoma, Kansas, Iowa, and adjacent sections.

SEPTEMBER.—Temperatures variable, probably averaged normal for country. Rainfall spotted; light falls in much of West and locally in Southeast.

OCTOBER.—Mild east of Great Plains; cool west. Rainfall generally light, except locally heavy in South-Central areas and in Southeast. Killing frosts south to Texas and Oklahoma, parts of Alabama and Mississippi.

NOVEMBER.—Warm east of Rocky Mountains; cool west. Rainfall generally light, except in Southeast and Northwest. Dry weather unfavorable in South and parts West. Cold weather damaging in Mississippi, Louisiana and practically all Southern states.

DECEMBER.—Warm in South and Southeast; cold elsewhere. Moderate to heavy rains east of Mississippi River and in extreme West; otherwise generally light. Dry, cold weather unfavorable.

SUMMARY.—First part of year warm in West, but cool in East; last part reversed. Rainfall spotted all year, except for heavy falls in Southeast and central valleys. Floods in Mississippi River in April-June. Hot, dry weather unfavorable for crops in July-August in interior of country.

QUALITY SEPARATION
By Differences of Density

By L. V. BURTON
Editor of FOOD INDUSTRIES

A UNIT OPERATION OF FOOD ENGINEERING

Separation

▶ Quality control is achieved in many ways. In the method discussed here, it is put into effect by automatic separation of raw materials into two streams having different properties or values. In principle, the method described is one of automatic separation of substances which have very slight differences of specific gravity or density.

This is No. 12 in a series on the unit operations of food engineering

Part I

QUALITY CONTROL, that really controls, is not very common in food manufacturing. Too often quality control is really nothing but a check-up after the goods are produced —just to see if everything went satisfactorily during production.

True quality control should exist in or during manufacturing operations. It should have the ability to effect such necessary separation of good and bad, or necessary variations of procedure or formula, as will actually control quality.

Control always means restraint. Hence to have actual and real control of quality it is necessary to start with suitable raw materials. "You can't make a silk purse out of a sow's ear" runs the old adage which summarizes centuries of human experience.

It is impossible to push by restraining. Likewise it is impossible to create by control or restraint. That elusive characteristic known as quality is usually something which nature confers on the raw materials of the food industry. In the factory the most that can be done is to conserve that natural quality either by suitable methods of preservation, or else by preventing the best quality of raw material from becoming diluted or mixed with raw material of a lesser degree of quality. In the latter alternative, the basic principle is that a mixture of GOOD and INFERIOR is an INFERIOR MIXTURE; or, that a mixture of GOOD and BAD is a BAD MIXTURE. And such is the philosophical basis of the well-known principle that graded farm produce will command a better price all around than run of the field, the orchard or even the hen-house. Why? The answer is not clear. Apparently mankind unconsciously reacts to mixtures of good, not-so-good, and poor quality or sizes in such a way that it will not pay as high a blended price as it would willingly pay for the various components of the mixture if they are separated out and sold separately.

Quality control some day may become a sort of creative act. Sometime it may be possible to convert second quality raw materials into first quality products. Conceivably quality control may some day become a sort of synthesis. But, until that time shall come, we must utilize the best methods of control that are available. And one of these is the matter of avoiding mixtures of two grades of quality after the raw material comes to the food factory, the economic motive being that the consuming public will seldom pay a better price for No. 2 quality just because it happens to contain a certain amount of No. 1 quality mixed with the No. 2 quality. And, on the other hand, even a little No. 2 quality often results in penalizing the going price for No. 1 quality when some No. 2 happens to be mixed in.

SO MUCH for the background. Now, to apply the principle to manufacturing; there are several raw materials which are susceptible to mechanized quality control or separation. And because the equipment for such quality control is of rather recent origin and because there is much disagreement about the value of the method—even how to apply the method—a study of this form of quality control has been made. It was made on the theory that where there is dispute and argument the facts are not known.

Quality control by separation by this method is, at the present time, in use only in vegetable canning and freezing plants. The method depends on effecting the separation by means of a liquid, hence the raw materials to be so treated must be such that contact with water will not be injurious to them.

There are, of course, other methods of separation where instead of a liquid there is used a gas—air. All fanning mills, cleaners and the like utilize the air blast to remove light materials from those which are much heavier. But, here is a method that can be used only were the differences in specific gravity are very marked. The rub comes when a separation is attempted on materials where the respective specific gravities or densities of the components of the mixtures are but little different from each other. And only until the liquid separation method arrived has it been commercially feasible to separate first quality and second quality raw materials by an automatic process where minute differences of density exist.

Specifically, the method has been successfully applied to peas, lima

In the next installment will appear a discussion of the engineering of the installation and the operation of quality separation equipment.

beans and is said to be applicable to cut sweet corn. Most of the industrial applications of the method have been on peas. For more than twenty years it has been known that tender peas have a lower specific gravity or density than harder peas. In general, the idea is: that as peas become more mature, they become tougher, harder and have a higher specific gravity, i.e., greater density, than they had when they were young and tender. (See S. L. Jodidi: Maturity Test for Peas, FOOD INDUSTRIES, **9**, 506, 1937).

As long ago as 1919, Hugh Funderberg, of the Keene-Belvedere Canning Co., Belvedere, Ill., was taking advantage of this fact and making a commercial quality separation by continuously pouring the peas into a brine of suitable density, then skimming off those which floated. These were the tenderest peas. Those which sank in the brine, thus separated from those which floated, were washed separately with fresh water to get rid of the adhering brine. Then they were packed separately.

The same method is now in considerable commercial use today, but it has been greatly refined and many additional features have been added. One of the greatest obstacles to the successful application of the method was: How can the specific gravity of the brine be properly controlled? In the old days it was done entirely by hand. It required the constant attendance of a man who added saturated salt brine or dry salt at intervals whenever his hydrometer showed that the density was growing lighter. The reason for the change in density is that the incoming peas are wet. They have been washed with water to clean them. Hence the incoming peas are bringing in fresh water and the outgoing peas are taking out brine. Progressive dilution of the brine is inevitable and, if quality separation is to be effective and uniform, the brine must be continuously held to its proper strength. Before the advent of automatic density or sp.gr. control equipment, the quality separator required constant attention of one man who did nothing else but control the brine density.

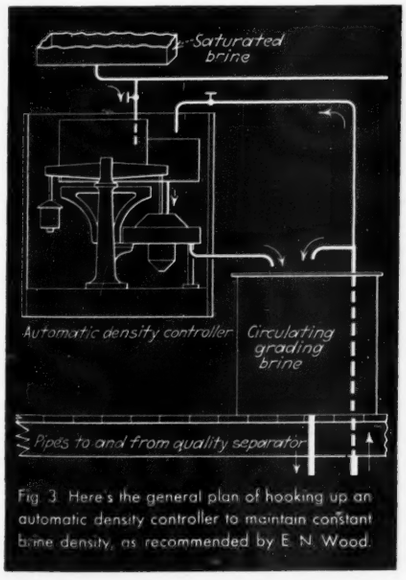
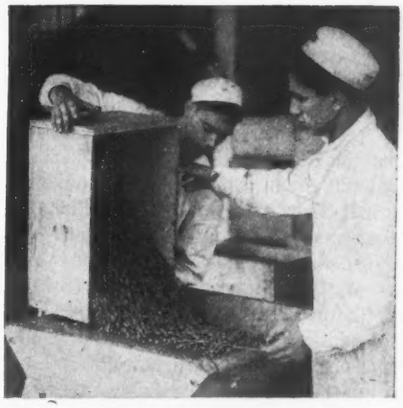


Fig. 3. Here's the general plan of hooking up an automatic density controller to maintain constant brine density, as recommended by E. N. Wood.

Since E. N. Wood developed the "Sal-Wood" automatic brine-density controller, the foregoing problem can be delegated to an instrument which is simple, rugged and dependable. But that alone was not the only problem in automatic quality separation.

Even though the general principle of progressive increase of density of the raw material with parallel decrease of quality was well established, the brine separation method did not always perform satisfactorily. This anomaly was discovered by W. H. Ames, of Marquesan, Wis., to be due to the fact that the raw material—peas—contains variable amounts of gas, usually considered to be air, and this gas had the effect of making the density separation inaccurate. Sometimes tough peas would float in a brine when they ought to sink. (See U.S. Patent No. 1,833,812. Nov. 24, 1931.)* He found that the operation of parboiling the peas in hot water—technically known as blanching—would eliminate the the anomalous behavior by driving out the gases which caused the errors. Dr. E. P. Walls of the University of Maryland also reaches "a very definite conclusion that blanching was necessary." (*Canning Trade*, p. 7, Jan. 4, 1937.) For his tests he uses five minutes at 185–195 deg. F.

* Licenses to operate under this patent are obtainable from Food Machinery Corporation.


Receiving raw material
How shall the material be handled in order to get the most profit from it?

Scientifically speaking, quality separation by the density method is simple in principle and the factors which introduce errors have been apparently eliminated. The operation appears to be scientifically sound. Yet there is an amazing divergence of opinion about quality separation as applied, for example, to pea canning. One firm will be strongly opposed to its use, while another firm will aver that it could no longer operate successfully without it. One company will regard it as a profitable—even a very profitable—operation, while another will declare that quality separation costs more to perform than it is worth. And even among the firms which employ the separators now on the market there is very little agreement. As to how the machines should be used, almost every

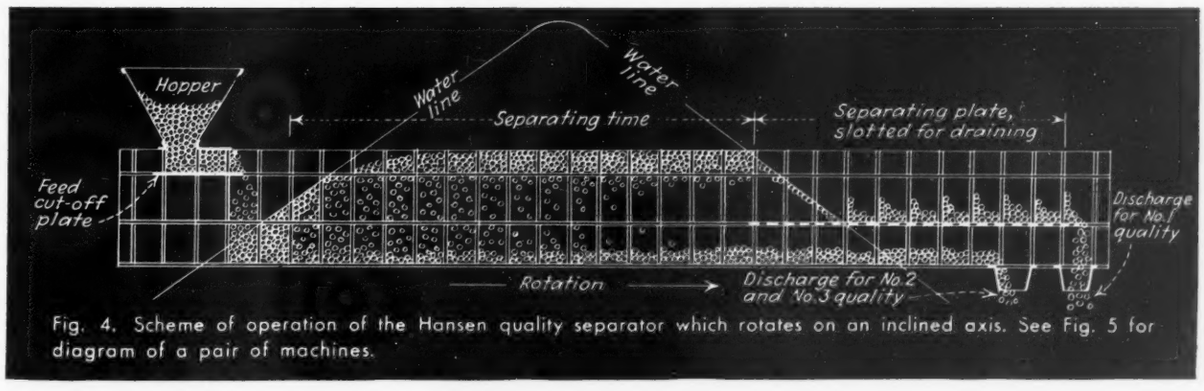


Fig. 4. Scheme of operation of the Hansen quality separator which rotates on an inclined axis. See Fig. 5 for diagram of a pair of machines.

conceivable type of installation has been seen, even to the extreme and absurd case of where the machine was never taken out of the crate because the plant superintendent was positive that the device was just as good in its crate in the warehouse as it would be if installed in the production line.

Also, installations have been observed which have omitted the very essential automatic density control regulator.

And, furthermore, installations have been observed where two streams of the separated raw material were emerging from their respective spouts or chutes, yet there was not a true separation of quality—though there was an apparent separation of different densities of raw material. Why is there such a great divergence of opinion as to the utility of the method, or the efficacy of the method? Why are there so many differing methods of installation and operation?

To the foregoing questions there seems to be only one answer. The whole operation of quality separation has not been adequately engineered except in a few cases. The equipment itself has been fairly well engineered but the *installation* of the equipment has not been engineered. Indeed when this study was commenced, there were comments—even from some equipment people—to the effect that the method was so simple that there was next to nothing to write about it.

A slight digression may be permissible here, for it is a very propitious moment to emphasize that here is one of the places where the food engineer should be at work—could be profitably employed. But outside of two of the companies whose operations have been studied, the approach to the problem has been the trial and error method. This is somewhat comparable to building a bridge without adequate design and computation of loads, stresses and strains, and with the expectation that, if the bridge fails, i.e., falls down, it will be rebuilt in a different manner, hoping that next time it will hold up. There is an important place for the food engineer in the food industries and here is one of the places where he should be at work.

To illustrate further, one item of data, which is of fundamental importance, seems to be completely lacking. Apparently nobody knows the true shape of the curve of the progressive changes in density of peas as the peas become more mature and grow tougher, expressed either directly or as the apparent density after varying blanching periods, if the various densities are plotted on coordinate paper against the number of days after the pea has flowered.

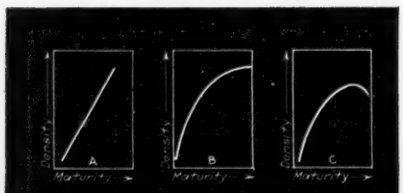


Fig. 1. How density of growing peas changes with maturity is apparently unknown. Here are three possible curves of the progressive changes.

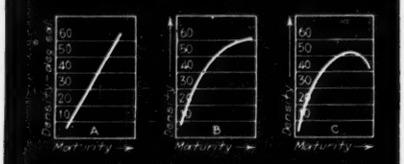


Fig. 2. To make a quality separation on the basis of density changes, it is important to know the shape of the curve. On curve B the "cut" would not be sharp at 50 deg. Sal. while on curve C there could be no quality separation above about 40 deg. Sal.

Conceivably, there are three general possibilities for such a curve, as illustrated by Fig. 1.

The design of all the quality separating equipment, and all methods of installation as well as operation appear to be based on the assumption that curve A of Fig. 1 is the true picture of the changes that occur in density. This assumption is that the curve is a straight line.

Against the validity of this assumption are several facts:

1. The data presented by S. L. Jodidi (See *F. I.*, **9**, 506, 1937) suggest that curve B is closer to the truth;

2. Some canners have observed that yellow peas—meaning presumably over-mature—sometimes come out of the quality separator where only tender peas are to be expected. And note the following quotation:

"This (anomalous behavior) was due to the fact that some larger, harder peas floated in all the lower percentages of brines up to and including the 10-per cent (10 per cent NaCl) floaters. This was noticed at the time and the presence of such peas lowered the grade. Why these peas should have floated here we have

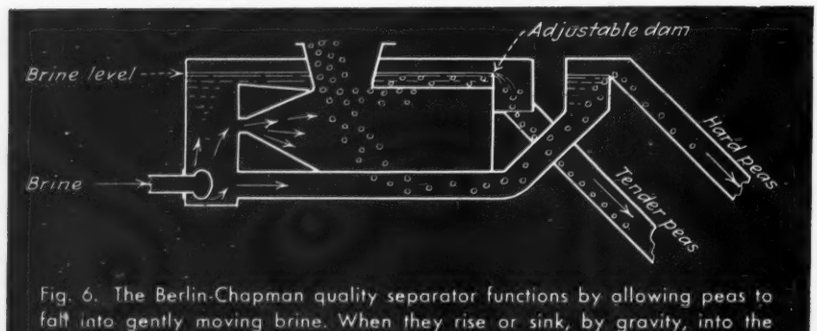


Fig. 6. The Berlin-Chapman quality separator functions by allowing peas to fall into gently moving brine. When they rise or sink, by gravity, into the swiftly moving streams at top and bottom they are carried out as shown.

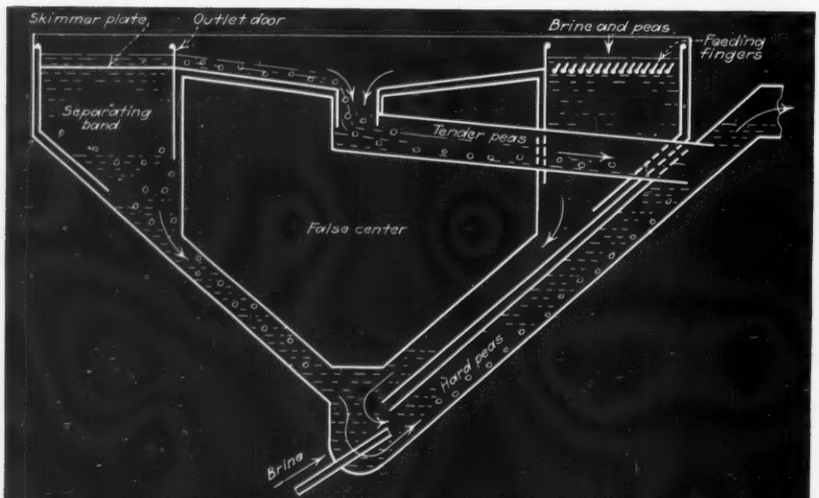


Fig. 8. In the Olney quality separator a revolving pair of arms deposits peas and later skims off the floaters. Sinkers are ejected by a brine jet.

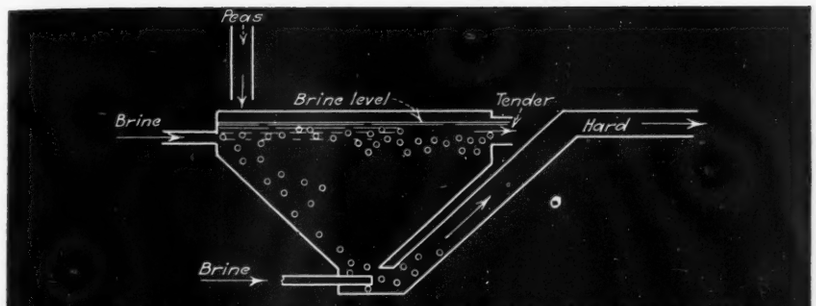


Fig. 7. The Lewis quality separator is a conical tank in which the brine circles. Floaters and sinkers are removed as indicated.

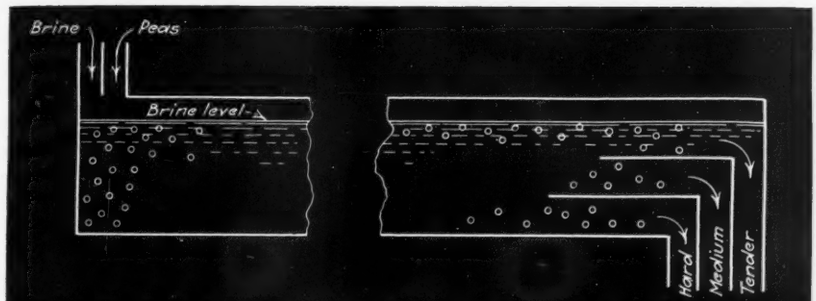


Fig. 9. The Chisholm-Ryder separates by pouring the peas into a swiftly moving stream of brine and draws them off at three different levels.

been unable to definitely determine. There might possibly have been some defect in the technique of blanching, although every care was taken to see that this was thoroughly done. Perhaps these peas had passed the stage of optimum and had commenced to lose weight. A third possibility is the effect of seasonal or geographical differences."—Excerpt from "Pea Grading Work in 1936," by E. P. Walls, of the University of Maryland. *The Canning Trade,* Vol. 59, p. 7, Jan. 4, 1937.

3. Sometimes the peas are separated into two streams, presumably of different densities, yet not differing noticeably in quality. What does this imply? Consider Fig. 2. The cross lines represent the salometer readings of the brines that correspond to the densities of the peas which will neither rise nor sink in such a brine. If the separator (or grader as it is often called) is operating, for example, with a 34 deg. sal. brine (corresponding to 1.066 specific gravity), then any peas which are lighter will float, while any peas which are heavier will sink.

If curve A is really the true picture of how the pea changes as it grows older, then it should be possible to get a clean "cut" at any desired density. If, however, curve B is the true picture then the "cut" or sharpness of separation will be cleanest at lower densities and will be less distinct at higher densities. Under this assumption, a more accurate separation would take place when peas correspond in maturity to the point where the curve crosses the 34 deg. line than where it crosses the 55 deg. line. If the crop were such that the separation would need to take place where the curve flattens out, then there is considerable likelihood that the separation will not be as clean—that there will be considerable mixing of tough and tender peas. (These figures are purely arbitrary.)

Now, assume that curve C is perhaps, after all, the true picture of the changes that occur in growing peas. Under such a condition any "cut" at any density from 40-53 deg. Sal. would be wholly meaningless for it would include both tough and tender peas. To effect a true quality separation, the cut would have to be made at some density below the figure corresponding to the end of the descending curve at the mature end.

What is the true condition? What are the facts? Which curve is the correct one? Is imperfect blanching the cause of the strange behavior sometimes met? Nobody knows. Yet here is a bit of data that everyone must realize is of fundamental importance for successful OPERATION (not design) of quality separators. This has nothing to do with design of the equipment. All the equipment on the market will operate at any designated brine-density. But from the viewpoint of the operator of the machine, the man who must decide at what brine-density the machine must operate to give the desired separation, the shape of the curve is most important.

General opinion seems to be that curve A—the straight line function—

(*Turn to page 56*)

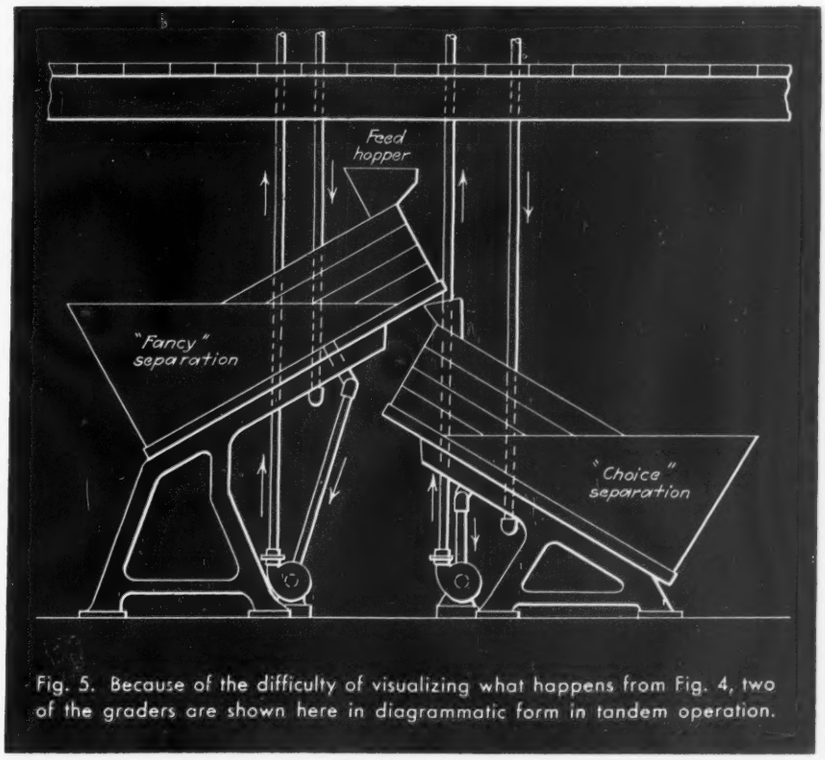
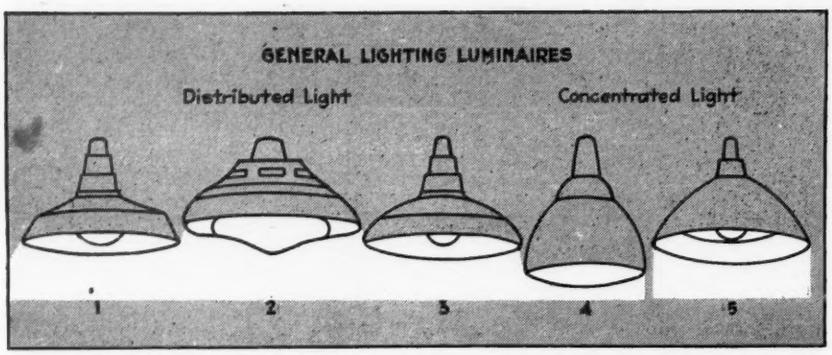


Fig. 5. Because of the difficulty of visualizing what happens from Fig. 4, two of the graders are shown here in diagrammatic form in tandem operation.

How much illumination is needed. Fixtures used to provide it.



(1) RLM standard dome—white porcelain-enameled; white-bowl lamp. (2) Silver-bowl diffuser—white porcelain skirt; Alzak insert, silver-bowl lamp. (4) High lain-enameled skirt; Alzak insert, silver-bowl lamp. (6) Angle reflector—inside-watt lamp. (9) Suplite—60-watt lamp.

Lighting the BOTTLING PLANT

By A. K. GAETJENS*

Illumination Engineer, Nela Park Engineering Department, General Electric Co., Cleveland, Ohio

▶ ***Proper illumination not only speeds production and improves quality but it reduces accidents and improves employer-employee relations. This article tells how much lighting is needed and the types of equipment that can be used to obtain it. The author discusses the general aspects of plant lighting and gives specific requirements for unit operations in bottling plants. The information is of practical value to***

All Food Manufacturers

THE FIRST ESSENTIAL of any artificial lighting system is a good installation of what we term general lighting, which is light in fairly uniform quantities distributed throughout the area under consideration. This can be obtained with a number of equipments, several of which have been on the market for many years and others of which are just being introduced. The well known RLM standard dome reflector is the most useful of this group. It is a white, porcelain-enameled, steel reflector designed for use with a white-bowl lamp. It has formed the basis for thousands of general-lighting installations, because it has the advantages of being highly efficient, durable and easily cleaned and is, therefore, applicable to a great number of industrial situations. The white-bowl lamp materially decreases the brightness of the lamp itself. This combination has proved highly satisfactory for a number of years. It should never be used with an inside-frosted lamp unless mounted in areas where there is very little visual work.

The second of our standard equipments is the Glassteel diffuser. This is a porcelain-enameled unit which has a glass globe to provide for complete diffusion of the light. This unit is very comfortable to look at, and where there is any reflection from bright objects it is exceedingly helpful in reducing the reflected glare. Its efficiency is a little lower than that of the RLM unit, and it is more difficult to clean. But in many locations these disadvantages are far outweighed by the increase in lighting comfort which results from its use. The third of the standard reflectors is the high-bay luminaire. This unit directs light downward in a definite beam and was designed for use where the lighting units are mounted 25 ft. and more above the work.

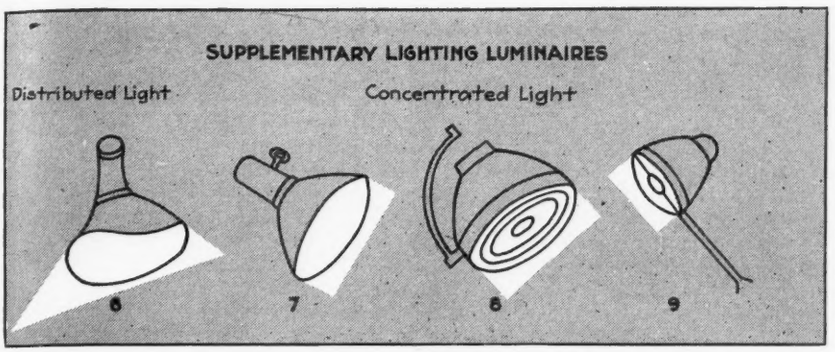
A new unit which will shortly be on the market is the so-called Silver-bowl diffuser. This luminaire is very similar in appearance to the RLM reflector and is actually as easy to clean. But because of the silvered cap on the lamp, which directs all of the downward light up into the reflector to be diffused throughout the room, very comfortable lighting is obtained. This type of equipment is designed for a general lighting system.

Another adaptation of this same principle, that of including a small aluminum insert to control the light while the porcelain-enameled skirt gives some degree of diffusion, is embodied in the Equalux. This, instead of distributing the light, is quite concentrating, and it is intended to provide localized general lighting. In other words, this reflector was designed to be placed over a machine which is to be illuminated to a high level. A series of these with fairly uniform spacing and not too wide separation will provide sufficient general light to form a good lighting system for a room.

There are few locations where it is possible to provide more than about 30 foot-candles comfortably and economically from a low-mounting-height, direct, general lighting system. However, there are many instances where much more than 30 foot-candles is not only desirable but necessary. For these, a type of lighting has been designed to supplement the general lighting system, adding to it as much as ten times the illumination of the general system.

To provide good lighting, this type of equipment must be very carefully designed and applied. You have long been familiar with bare lamps hung over positions where light was needed. The use of these is an extremely detrimental practice. For example, if there are 10 foot-candles falling upon an object from some other source of lighting, and a bare lamp is glaring to the extent of 5 foot-candles on the eye, 42 per cent of that 10 foot-candles of general lighting is being

* From an address at a special meeting held in conjunction with the convention of American Bottlers of Carbonated Beverages at New Orleans, Nov. 15–19.



Glassteel diffuser—white porcelain-enameled; opal-glass globe, clear lamp. (3) bay—Alzak, prismatic or mirrored glass; clear lamp. (5) Equalux—white porce- frosted lamp. (7) Industrial projector—100 or 200-watt lamp (8) Suplite—150-

wasted when the angle between the object to be seen and the bare lamp is 40 deg. In effect, you are getting only the value of 6 foot-candles. Suppose the bare lamp is within 5 deg. of the object to be seen. One is then throwing away 84 per cent of the 10 foot-candles that is falling upon the object. In addition to the actual ineffectiveness of the bare lamp in providing illumination, it is also detrimental from the standpoint of causing severe eye strain and headache among the employees.

There is one very important factor in providing supplementary lighting which must always be considered. With a supplementary unit, it is possible to have as much as ten times as many foot-candles in one region as the general lighting provides. It has been found that if the ratio between the supplementary and general lighting is greater than this, discomfort, eye strain and general difficulty in seeing will result, just as it did with the bare lamp. The reason for this is somewhat the same—that is, it has been found that the eye, instead of gazing continuously at the visual task, glances away to rest itself. When there is too great a difference in the brightness at which it looks, the pupil of the eye must always adjust itself to admit more or less light depending upon the brightness of the objects it is seeing.

With these general considerations as a background, the lighting for specific sections of the plant can be considered. In the bottling room which is the heart of every plant, general lighting of 10 foot-candles is recommended. This intensity is needed for cleanliness and traffic safety, and to provide the background of general lighting which is so necessary where supplementary higher levels are required.

At the feed end of the soaker, the operator should pick out chipped or extremely dirty bottles which might cause trouble in the soaker or later in the filling and crowning machines. At the clean-bottle end of the soaker, there is inspection for foreign matter which may not have been removed in the soaker. This inspector also catches chipped bottles which may have passed the other operator and in many plants could very advantageously pick out odd sizes of bottles. A level of lighting of approximately 100 foot-candles is recommended for both ends of the soaker. If provided by two lamps in angle-type reflectors placed so that the "cutoff" is at the conveyor line, fairly good visual conditions should result.

At the syruper, the filler, the mixer and the labeler, it would be exceedingly desirable to add to the general illumination one supplementary lighting unit directed upon each machine. These units should be mounted approximately 2 ft. above and to one side of the machine. This would facilitate clearing any trouble which might arise. Particularly on the filler, mixer and the labeler, trouble is likely to occur in the form of broken bottles.

Many plants have found it desirable to have a special inspector who examines all the bottles after they have been crowned. This is an extremely exacting task because it is necessary to differentiate between marks on the bottle and sediment or other foreign matter in the liquid. The best device which has been developed for this purpose consists of a luminous panel mounted on one side of the line of crowned bottles. The operator sits on the other side, and the bottles pass between him and the panel. This is a very effective arrangement. In some plants, this unit has been supplemented with a large magnifying glass, approximately 14 in. in diameter, which increases considerably the ability of the inspector to see small objects. If any of you have been troubled with breakage of the opal glass pane in this device, there is a new unbreakable Plaskon sheet which could be used as a substitute.

At the accumulating table, many operators also include their final inspection, along with the packing. Investigation has revealed that it would be desirable to illuminate the bottles from below. This would aid the packers to see the contents clearly and easily, enabling them to reject any bottles with sediment or other foreign matter which might have slipped by previous inspections. This is rather impractical because of the nature of the accumulating table. However, it was found that by using a white, porcelain-enameled, steel top instead of the conventional nickel top, very good visual conditions were obtained when a diffusing source was placed above the porcelain-enameled top. For this application, the new silvered-bowl diffuser is probably the most desirable type of unit. It should be mounted approximately 2 ft. above the table and equipped with a 300-watt, silvered-bowl lamp to obtain the best possible lighting conditions.

Another machine which is frequently found in the bottling room is a siphon filler. The higher pressures involved frequently are a possible source of danger to the man operating this machine. Whenever trouble arises, he must act quickly. For this reason, it would be highly desirable to equip this area with a supplementary lighting unit similar to those used on the other machines.

In the receiving room, it is necessary for the operators to separate and recase mixed cases. Because of the continuous application and fairly difficult nature of the work, it is suggested that 20 foot-candles be pro-

(Turn to page 54)

Summary of Recommended Plant Lighting Intensities

A. Bottling room	10 fc. general, throughout
1. Soaker	
a. Feed end	100 fc. supplementary
b. Clean-bottle end	100 fc. supplementary
c. Gages (intermittent reading)—no additional light	
2. Syruper	40 fc. supplementary
3. Filler	40 fc. supplementary
4. Mixer	40 fc. supplementary
5. Labeler	40 fc. supplementary
6. Siphon filler	40 fc. supplementary
B. Shipping and receiving rooms	
1. Active working areas	20 fc. general
2. Storage areas	5 fc. general
C. Syrup room	20 fc. general
D. Offices	20 fc. general

Pushing a pan of packaged meat into tunnel of quick freezing cabinet. Dry ice is placed in upper compartment.

Cutting and trimming machine freezing cabinet is near the pack-

QUICK FREEZES Meat *by New Low Cost Method*

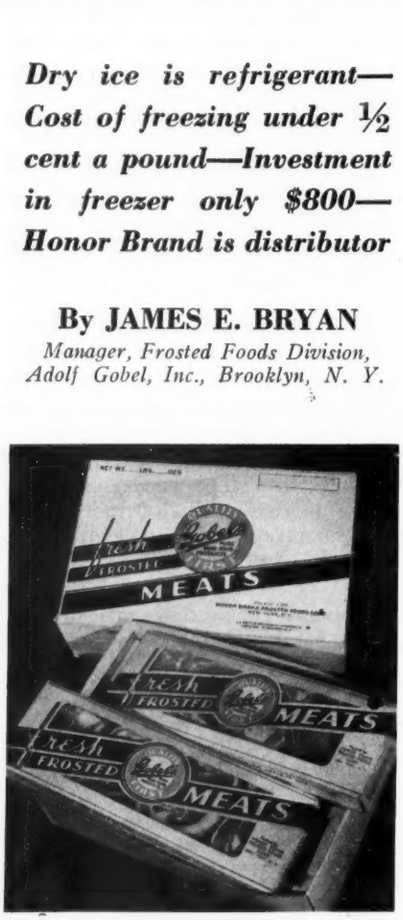
Dry ice is refrigerant—Cost of freezing under ½ cent a pound—Investment in freezer only $800—Honor Brand is distributor

By JAMES E. BRYAN
Manager, Frosted Foods Division, Adolf Gobel, Inc., Brooklyn, N. Y.

SIGNIFICANT as another contribution to the "second renaissance" of the quick-frozen food business, more than a dozen meat products are now being quick frozen by Adolf Gobel, Inc., Brooklyn, N. Y. And these items are distributed as far West as Chicago in the 35 principal cities in which there are outlets for Honor Brand "fresh frosted" foods. Gobel is quick freezing under its own label for Honor Brand Frosted Foods Corp., New York, and the company also will supply meat to other distributors of frosted foods.

Something new and different in the way of quick freezing equipment is being used by Gobel, having been developed by the author. It is a dry ice freezer, a unit which was built by the company's own mechanics and carpenters at a cost of only about $800, which quick freezes meat at a cost of less than ½ cent a pound and which has a capacity of 1,000 lb. of meat an hour.

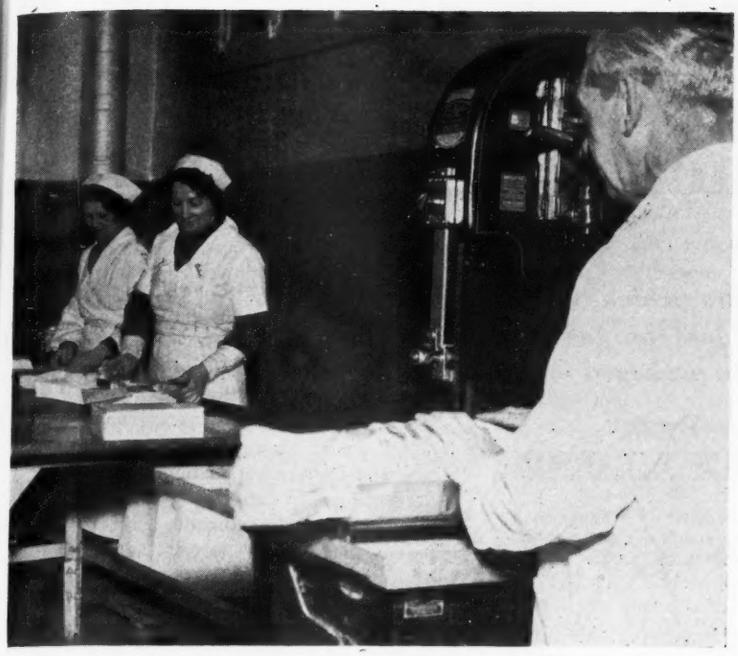
This extremely low-cost freezer is nothing more than a cabinet built of five-ply wood, inside and outside, and lined with 4 in. of cork insulation. It measures 11 ft. long, 8 ft. wide and 5 ft. deep. In this cabinet are three tunnels, extending the long way of the cabinet and measuring 2 ft. wide and 4 ft. deep. The lower part of each tunnel is provided with three tiers of angle-iron racks to support 16x24-in. stainless-steel pans that hold the packages of meat. The upper part is a compartment for the dry ice, the cabinet having space for 1,500 lb. of the refrigerant. The dry ice, which is used in 50-lb. cubes, is placed above the product because chilled air is denser than warm air and so flows downward over the meat by gravity.



One-pound packages of quick frozen meat and carton containing six of the packages. The meat is wrapped in Cellophane before it is put into the 1-lb carton.

In operation of the freezer, each tunnel is filled with pans of meat, the freezer holding about 1,000 lb. of meat at one time. Then the tunnels are closed until freezing is completed, which is within about one hour. Now the tunnels are opened at both ends, and pans of unfrozen meat are pushed into them at the receiving end, which is adjacent to the packaging table. This forces the pans of frozen meat out at the discharge end, where the meat packages are put into large cartons and taken to the storage room. In operating the freezer, it is, of course, the practice to have one tunnel of meat freezing while packages are being prepared to go into the second and the third tunnels.

To provide an even temperature throughout the freezing tunnels and to speed the extraction of heat from the meat, air is circulated over the dry ice and through the meat tunnel. This is done by a little fractional-horsepower blower placed in one end of the dry ice section of each tunnel. The temperature in the tunnels runs



and packaging table where meat is prepared for quick freezing. The aging table, to the left

Quick freezing is moving ahead by leaps and bounds. Many food processors are adopting this method of preservation. Many more will in the future. There will be a battle for markets. Prices will come down. And packers with the most economical method of quick freezing will have the advantage. The method described in this article is worthy of consideration by

All Processors Interested in Quick Freezing

between 40 and 60 deg. F. below zero, and the meat, which goes into the freezer at a temperature of 35 deg., comes out at a temperature of 35 deg. below zero. In the storage freezer, the product is kept at a temperature of zero, refrigeration being by direct expansion ammonia coils. The room in which the meat is packaged and frozen is at a temperature of 56 deg.

The meat is frozen by Gobel in the package, being wrapped in a special moisture-proof Cellophane and placed in double-waxed cardboard cartons having cut-outs in the face through which the meat shows. These containers are of the folding type, the Cellophane-wrapped meat being laid on the flattened cardboard and the carton being folded around the meat. In packaging ground meat products and meat for stew, a form is used to shape the meat to fit the carton, this form being about ½ in. deep and of a width equal to that of the carton. Its length is only half that of the carton, because the meat is put into the carton in two half-pound individually wrapped units. This enables the housewife to use half the package at a time and keep the other half. After freezing, six of the packages are placed together in a large carton, also made of double-waxed cardboard, a material which is impervious to moisture.

To prepare the meat for packaging, such cuts as pork chops, lamb chops and steaks must be trimmed of excess fat and bone, and sometimes of enough lean meat to make the cut fit the package. But these trimmings are not wasted. Part of them goes into high-quality sausage, and part is quick-frozen as lamb for stew or beef for stew. The meat is cut into pieces, such as individual chops, and trimmed on a Jim Vaughan cutter, a band-saw type of machine. Loins and backs are supplied to this operator in push trucks, covered with heavy wrapping paper to keep the meat clean. This meat is taken from the plant's regular supply, coming down to the quick freezing department from the cutting room. Only top quality meat, however, is routed to the quick freezers.

The operator who does the trimming and cutting has developed skill until she can cut the pieces approximately to the desired weight and to the proper shape. The weight, of course, cannot be determined exactly by eye, so the packages are weighed and the net weight marked on them. This makes possible the sale of meat not at so much a package but so much a pound. Weighing is done by the girls on the packaging table. The large cartons which contain six of the individual packages are also marked with the net weight of their contents.

WHEN operations are at full capacity, eight girls, skilled in this job, work at the packaging table, which has a stainless-steel top measuring 4x15 ft. These girls, together with the one on the cutting machine and a man for bringing in supplies and taking the frozen meat to the storage room, can turn out some 8,000 lb. of frozen meat in an eight-hour day. This provides a low labor cost, which goes hand in hand with a low investment in equipment and a low freezing cost to make an economical system of production.

The dry ice with which the freezing is done is purchased at less than 2 cents a pound. This, however, does not include a delivery charge, because Gobel's trucks pick up the dry ice in Manhattan and carry it to the plant in Brooklyn where the quick-freezing is done. The refrigerant is stored in an ammonia-refrigerated freezer where the temperature is 8 deg. F.

One pound of this dry ice will freeze 4 lb. of beef and 6 lb. of pork, this refrigerant having a temperature of —109.6 deg. and being capable of taking up 280 B.t.u. per pound. An effect other than freezing is obtained with the dry ice. It is found that the carbon dioxide gas improves the bloom of high quality meat.

Gobel has no particular distribution problem in connection with its quick freezing operations, because of its policy of supplying the products, under its own label, to distributors.

The line of products being quick frozen includes steaks (minute and sirloin), lamb chops (loin and rib), pork chops (center and end), chopped beef, beef for stew, lamb for stew, beef for roast, loin pork roast, pork sausage links and leg of veal. All of these are to be distributed in the 1-lb. packages, except the leg of veal, which is too large. The 1-lb. packages are supplanting the 5-lb. containers that Gobel used for four months.

Gobel expects to quick freeze about one million pounds of meat in the next year. And if the business calls for it, another freezer cabinet will be installed to double the capacity.

A significant factor in the distribution of quick frozen meat is the fact that the retailer can handle meat without hiring a butcher.

PASSAGE OF MOISTURE Through Packaging Materials

Ten factors which influence the loss or gain of moisture in packaged foods

By
FREDERICK T. CARSON [1]

National Bureau of Standards,
U.S. Department of Commerce,
Washington, D.C.

SOME WRAPPING MATERIALS, and other membranes as well, that are practically impermeable to air allow moisture to pass through them readily. Various explanations that have been given for this strange behavior are reviewed briefly.

At least ten factors that ordinarily influence tests of the permeability of membranes to moisture are discussed. These are time, area of specimen, thickness of specimen, leakage, vapor-pressure difference, relative humidities, temperature, total pressure difference, diffusion in still air and state of the moisture in contact with specimen.

Since impermeability to moisture is an essential characteristic of food wrappers, as also of many other films and membranes, it is important to inquire how moisture may pass through such materials, to understand better how to circumvent the possibility. It is also important to know how to test the materials to prove their worth. Because of the importance of these matters, an extended survey of the literature has been made. Those interested in the technical details are referred to the published report.[2]

It is frequently found puzzling that a membrane or sheet of material that is practically impermeable to dry air may allow comparatively easy passage of the water vapor in air, which is seldom more than 2 or 3 per cent of the mixture of gases of which air is composed. This favoritism toward the passage of water vapor, or atmospheric moisture, shown by some food wrappers and other membranes that seem impermeable to gases is not only puzzling, but may be annoying, embarrassing and expensive. A familiar example of this behavior is afforded by ordinary regenerated cellulose, such as Cellophane, which, although practically impermeable to air, allows moisture to pass through readily. Much effort and expense have gone into moisture-proofing such material to make it serviceable where impermeability to moisture is desired. The trouble is by no means confined to food wrappers, however. Tests have shown rubber to be as much as 50 times as permeable to water vapor as to hydrogen. Various gas-cell fabrics used in airships, although nearly impermeable to hydrogen or helium, permit troublesome amounts of water to pass from the atmosphere into the interior of the gas cells.

The obvious way for water vapor or other gases to get through a membrane is by passing through holes, imperfections or capillary passages that may be in the membrane. Sheet materials that readily permit the passage of air presumably have some such channels through which water vapor can flow also. In some materials, such as impregnated papers, the structural pattern may provide the necessary channels. Waxed papers, for example, may allow water vapor to flow through or along the fibers (some of which extend from one surface to the other) if the waxing has not been done sufficiently well.

Many sheet materials of importance in packaging foodstuffs, and for many other uses, do not have holes or microscopic passages through which a gas or vapor might readily pass. The fact that a material is practically imper-

[1] Publication is approved by the Director of the National Bureau of Standards of the U.S. Department of Commerce.

[2] Carson, Frederick T., "Permeability of Membranes to Water Vapor, with Special Reference to Packaging Materials," National Bureau of Standards Miscellaneous Publication M127. Copies of this publication can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 5 cents each. (Stamps should not be sent in payment.)

Food manufacturers use a wide range of wrapping materials to guard against either an increase or a decrease in the moisture content which their products carry when they come off the quality-controlled production line.

meable to air argues immediately that, if water vapor passes through it readily, there must be some other explanation of the process. Moisture does get through materials that air cannot get through. How is it possible for it to do so?

Although this question cannot be answered with certainty, several explanations have been offered in attempting to answer it. Many believe that moisture passes through a membrane by dissolving in the membrane on the moist side, diffusing through it and evaporating on the drier side. Viewed in a broad sense, this is a very helpful way of looking at it, although several technical objections have been made to the literal acceptance of this view. Some seem to find a sufficient explanation in the tendency of hygroscopic sheet materials to absorb a certain amount of moisture from the atmosphere, the amount absorbed depending on the relative humidity of the atmosphere. If the humidity is high on one side of the sheet and low on the other, the moisture content of the moist face of the sheet will be greater than that of the drier face, and there results a tendency for this moisture content to become equally distributed throughout the sheet. Such an equalization can come about only by the flow of moisture through the sheet. This view, however, does not offer any explanation of how the flow of moisture through the sheet actually takes place. Others attempt to explain this flow in terms of absorption phenomena. The water molecules, being of a kindred nature to those of many membranes, form an alliance with the molecular structure of these membranes such that they can worm their way into the structure where the molecules of other gases would not be admitted. The water molecules are thus presumed to enter the structure, swell it and eventually penetrate through it in profusion.

Whatever may be the true explanation of how moisture travels through apparently impermeable membranes, it is a fact of common experience that it does so, to the annoyance of manufacturer, distributor and consumer of foodstuffs and numerous other articles.

At least ten variables have been recognized that affect the rate of passage of moisture through membranes. It is particularly important to control these variables in the process of testing a material for permeability.

1. TIME.—Although the amount of moisture passing through a membrane will be proportional to the time after

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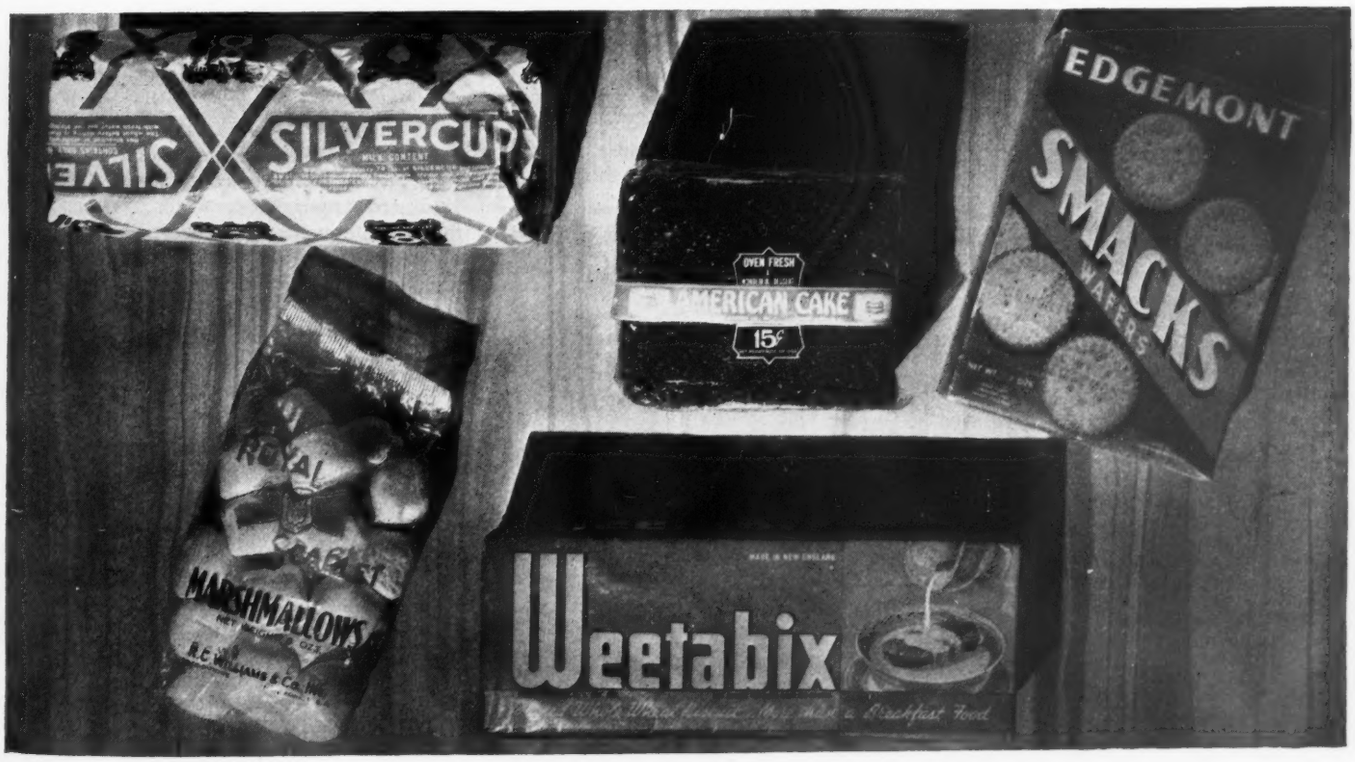
▶ ***Many factors affect the penetration of moisture through food wrappings. Those who are investigating such materials are only beginning to understand the way in which moisture escapes or enters and the factors which affect these changes. Ten of these factors are discussed in this article. Later this year FOOD INDUSTRIES will present another article in which methods of testing will be described and the results of tests will be summarized. These articles are of interest to***

Bakers
Dried-fruit and Vegetable Packers
Potato Chip Manufacturers
Confectioners
Manufacturers of Grain Products
Meat Packers
Tapioca Manufacturers
Macaroni and Noodle Manufacturers
Nut Packers
Manufacturers of Powdered Foods
Other Food Manufacturers

The range of foods in which a gain or loss of moisture is undesirable is quite wide. This and the accompanying illustration show a few foods packaged for the purpose of preventing either drying out or the development of a soggy or sticky condition while on the grocers' shelves.



a steady rate of transpiration has been established, the fact is frequently not appreciated that some time is required for the steady rate to be attained. It may require from a few minutes to several days for the process of diffusion, swelling and distribution of moisture within the membrane to reach a steady state so that the rate of transpiration becomes constant. A measurement should not be begun until this steady state has been reached.

2. Area.—The amount of transpiration of moisture is also presumably proportional to the area of the membrane, but the difficulty is in knowing what the area is in most tests of membranes, where the manner of holding and sealing the edges of the specimen makes the area indefinite.

3. Leakage.—Aside from the question of defining the area, it is very difficult to fasten a membrane to a test cell so that no moisture can leak in or out at the edges, and to avoid at the same time any injury to the membrane. Leakage through the edges, between the specimen and the clamping surfaces, or through broken seals, is one of the most common and most serious sources of error. Seals are commonly made with such materials as waxes, rubber cement and petrolatum. The application of the seals usually results in an indefinite area of the membrane being exposed to the moisture. An altogether satisfactory edge seal that defines the area precisely, that prevents edge leakage, that does not itself absorb moisture and that does not injure the membrane is very difficult to achieve.

4. Thickness.—There is some uncertainty as to how permeability to moisture varies with the thickness of the membrane. From the standpoint of a consumer standard, however, it makes very little difference, since the overall permeability of a wrapping material is of more importance than its unit-thickness value.

5. Vapor-pressure Difference.—The difference in vapor pressure, determined by the temperature and the humidity on each face of the membrane, provides the driving pressure for the passage of moisture. As a general rule, the rate of passage of moisture will be proportional to the difference in vapor pressure, but there are important exceptions to the rule. Furthermore, it is not always possible to know what the difference in vapor pressure is, because of the non-uniform distribution of water vapor in the still air inside the cell as it is ordinarily set up and used. Water in a cup, for example, will not produce saturated water vapor directly under a membrane fastened over its mouth if moisture is escaping fairly rapidly through the membrane.

6. Relative Humidity.—A very high relative humidity on one face of the sheet tends to upset the normal relation between the difference in vapor pressure and the rate of transpiration of moisture, making the transpiration more rapid than would be expected from the difference in vapor pressure. A number of workers have remarked upon the importance of relative humidity and the moisture content of membranes in relation to the permeability of these membranes to moisture.

7. Temperature.—The effect of an increase in temperature is primarily to increase the permeability to moisture by increasing the driving pressure. Some workers, however, have reported an increase in permeability greater than can be accounted for by the increased difference in vapor pressure. Others have reported also that a temperature somewhat above the summer range is sufficient to damage some wrapping materials so as to increase greatly their permeability to moisture. Condensation on the sheet may occur by even a slight fall in temperature if saturated or nearly saturated water vapor is in contact with one face of the specimen.

8. Total Pressure.—A test of permeability to water vapor is usually very slow in the case of the types of materials that are impermeable to air. Sometimes an attempt is made to hurry such a test by applying pressure or by creating a vacuum on one face of the sheet. This does no good, however, if the membrane is impermeable to air. The pressure due to water vapor is the driving pressure for the transpiration of moisture, whether or not there is any air pressure, and the transpiration will not be aided by air pressure. A difference in the atmospheric pressure (total pressure) on the two faces of the test specimen may do much harm, however. It will tend to bulge and stretch the specimen, and to break the seal and cause leakage. Tests of materials have been reported in which an increase in the apparent permeability was observed when vacuum was applied on one side, but the increase probably resulted from leakage or injury to the specimen resulting from the difference in total pressure. Fluctuations in atmospheric pressure (barometric pressure) may affect the test through slight errors in weighing if the transpiration of moisture is determined by weighing at intervals a cell containing a considerable volume of air.

9. Diffusion in Still Air.—It is very common to test for permeability to water vapor by using a cell with a considerable air space under the specimen. Diffusion of water vapor in this still air is very slow. If the membrane is fairly permeable, the humidity or vapor pressure may vary considerably at different levels within the cup, making it very difficult to know what the difference in vapor pressure is between the two faces of the sheet. This source of uncertainty is most serious with very permeable material. It can be minimized by making the air space under the specimen as thin as practicable, and could be eliminated if this air could be circulated. It is of course easy to circulate the air on the exposed face of the specimen.

10. State of Moisture.—Some materials, such as paper, will absorb more moisture and transmit it more rapidly if one face is in contact with water than if it is in contact with the saturated vapor from water. Other materials, such as rubber, behave about the same way in contact with moisture, whether it is in the liquid state or the vapor state. Only in the case of certain materials, therefore, can the test be simplified by having one face wet with water.

It is evident from the foregoing discussion that the passage of moisture through a wrapping material or other membrane is not as simple a penomenon as it may at first appear to be, and that the testing of such membranes is complicated by many factors that contribute to the difficulty of making reliable and accurate tests. Methods of testing and results obtained by different methods, and observers on various kinds of sheet material will be reserved for future discussion.

High heat conductivity of aluminum baking pans is indicated by color of bottom crusts of loaves baked in aluminum and tinned pans. Oven set to bake bread in aluminum: (1) Crust of loaves from aluminum pan has rich color while (2) crust of loaves from regular tinned pans is noticeably less rich and is lighter in color. Oven set to bake bread in tinned pans: (3) crust of loaf from aluminum pan is dark in color indicating too much heat while (4) crust of loaf from tinned pan is normal in color.

ALUMINUM PANS *Cut Baking Costs*

Effect savings in fuel, greasing and cost of cleaning. Also improve appearance of product. Improved design makes this type af pan practical.

By GEORGE GARNATZ
Kroger Food Foundation, Cincinnati, Ohio

▶***Progress in the constructi n of equipment from light-weight metals is making these metals suitable for operations which heretofore required heavier and stronger materials. And some of these light metals offer to food processors the advantage of higher heat conductivity in baking and cooking equipment. So the performance characteristics and design details of the bread pans discussed in this article have value throughout***

All Food Processing Industries

AFTER slightly more than two-years of experience with a particular type of an aluminum baking pan, we have reached the conclusion that it has proved its worth. This pan makes available to the baking industry a practical, rugged pan which gives the baker the advantages that accrue from the use of aluminum.

In first cost, this pan represents a sound investment. It makes possible savings in fuel, grease, labor of greasing and cost of cleaning. It also has a long life with sustained baking efficiency. It gives the finished loaf an improved appearance and a more uniform and better bake than we have ever had through the use of other types of pans.

These advantages need not be surprising. Aluminum has been recognized for some time as a desirable metal from which to make baking pans. It is light in weight, has a pleasing color, is resistant to corrosion, has a high heat-transfer rate, and a high heat-radiation quality. Because its heat transfer, (thermal conductivity), is about three times better than that of steel, it can deliver heat more rapidly to a mass of dough or bread. This property results in superior baking qualities, particularly in comparison with the usual type of baking pan made from tin-plated steel. However, until just recently, only laboratory workers took advantage of aluminum as a material for baking pans because early attempts at commercial use of them were not successful, primarily because the aluminum lacked adequate mechanical strength. It was too soft.

This aluminum pan that we have found so satisfactory for commercial use was introduced to the baking industry some time prior to July, 1935, by Ashley F. Ward of Cincinnati, Ohio. Known as the "Protektapan" it combines the baking properties and advantages of aluminum with the protective and wearing qualities of steel. The pans are made from a rolled sheet of aluminum 0.050 in. thick. They are strapped together in any desired number by mounting them in a sturdy frame of cold-rolled-steel stock, 0.060 in.

The mounting of the pans in the frame does not hold them rigidly in place; they are suspended on two assembly wires extending lengthwise through the frame. These wires are made of crucible spring steel and permit the pans to move up and down. In this way, the pans are not only protected from shock, but are capable of automatically establishing normal contact with the oven hearth. The mounting is such that the pans are well protected from mechanical damage. Moreover, individual pans are replaceable.

Since Protektapans weigh approximately the same as tinned pans of comparable type, they work no hardships on the operators. They are easy to stack and automatically align themselves. They ride pan trucks well, and do not stick or jam upon unstacking preparatory to greasing or panning.

In the commonly accepted meaning of the term, the pans do not "nest," and the soiled exterior of one pan cannot come in contact with the clean interior of the pan below. The design provides for this by means of shoulders on the frame. The horizontal or sideway movement of the frames is also limited, so that it is less than the clearance between the walls of the pans in the frame below and those in the frame above. Soiling of the pans is thereby reduced, and opportunities for denting are made quite remote.

Manner in which baking pans may be cleaned is shown by the results obtained when (1) soiled pans are (2) treated with a special cleaner for aluminum and (3) when treated with ordinary cleaners. (4) A striking contrast is obtained when half of a strap of pans is treated with the right cleaner and the other half is left untreated.

THE LOAVES baked in these pans are remarkably free from burned bottoms, light sides and light ends. The richness of crust color and the uniformity of its development is just as noteworthy with pans in use for two years as is the case with new pans. As previously pointed out, the thermal conductivity of aluminum is the principal factor contributing to the superior baking performance. Nevertheless, the beautifully uniform bake obtained does not depend solely on this characteristic.

The design of the frame provides for automatic spacing of the straps to insure free circulation of heated air. Sometimes, particularly in traveling ovens, trouble is encountered during the feeding of pans into the oven through the tendency of the straps to climb and ride on the strap just ahead. No trouble of this nature is encountered with Protektapans.

The self-leveling feature of the pans also contributes to good baking results. Each individual pan is permitted to assume normal contact with the oven hearth independent of any other pan with which it is strapped. This is a significant feature if one accepts as fact the statement that 90 per cent of the baking deficiencies usually attributed to ovens, results from the warping of present-day strappings.

Another desirable characteristic of aluminum pans is that no preliminary "burning off" or "breaking in" is required. Aluminum also possesses high thermal radiation. This property, aided by flue-like stampings in the frame, permits the pans to cool more rapidly than is usual for bread pans. While no recorded data on this point are available, it is estimated that the greater rate of cooling may permit an extra bake per shift in a given lot of pans. We have not made actual measurements of savings in fuel through the use of aluminum pans because of the lack of proper facilities. It is obvious, though, that appreciable economy is obtained as is indicated by the following observations.

If bread in aluminum pans follows a batch in the regular tinned pans in a traveling oven, a much heavier or more solid bake is obtained on the loaves in the first few rows of aluminum pans until temperature adjustments can be made. On the other hand, the loaves in the first several rows of tinned pans following aluminum pans have pale ends, sides and bottoms until the oven heat can be increased. The saving in fuel is further indicated by the smaller number of burners required when a run of bread is being baked in aluminum pans. Experience indicates that on the average, under comparable conditions of type and size of loaf, baking temperatures of 40 deg. F. lower are required when using aluminum pans as compared with tinned pans. Experts in the application of gas as a fuel estimate that a saving of approximately 15 per cent is obtained.

In working with Protektapans, some very interesting observations were made in connection with greasing. When two types of lard oil were used, the number of bakes between greasings was no different than with the regular type of pan. Some trouble, though, was experienced with sticking. This sticking was accompanied by the development of a brown stain. When a solid vegetable or animal fat—a hydrogenated shortening or lard—was used, the brown stain was not encountered. It was also found that greasing was required much less frequently. Six bakings between greasings have been obtained consistently. There have been instances when as many as twelve consecu-

tive bakes have been made on one greasing without any trouble with sticking. It is necessary, however, to grease after each bake for the first two or three times when starting with new pans. Thereafter, more infrequent greasing can be practiced.

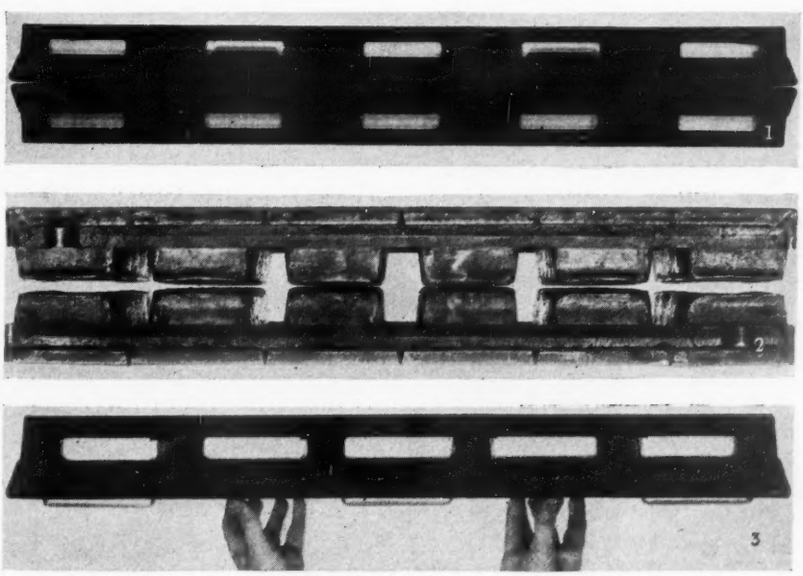
No satisfactory explanation for the difference in behavior of greasing materials is at hand. The fact that one type of greasing material is an oil, whereas the other is a solid fat, may have some significance. Porosity of the aluminum may be a factor. Some advance the theory that lard and hydrogenated vegetable fats lend themselves more readily to the formation of a tenacious film of aluminum soap by reaction with the oxide coating on the aluminum surface. Others suggest the formation of a film, through the oxidation or polymerization of the fats under oven temperatures, to which the dough or bread will not stick. Whatever may be the explanation, actual observation shows that through the proper selection of a greasing material, economies in the use of aluminum bread pans are obtained because less greasing material is used and less greasing labor is required.

The detergent materials used to clean tinned pans should not be used for washing aluminum pans. Ordinary cleaners and raw chemicals, such as soda ash, trisodium phosphate or caustic soda should never be used. They will corrode and blacken the aluminum. If, through error, the wrong type of detergent be used on aluminum pans and blackening result for that reason, the pans may be restored by treatment with nitric acid. The operation should be entrusted only to an individual competent to carry out the process intelligently.

We have had actual experience with but two commercially available aluminum pan washing compounds put out by the Diversey Corp. and designated "Diversey S.S. Aluminum Cleaner" and "Diversey A.A.A. Aluminum Cleaner." Both give satisfactory results, although the "Diversey A.A.A. Aluminum Cleaner" is recommended by the manufacturer for this type of aluminum cleaning. It does a good job of removing the baked-on grease and contamination without in any way corroding or injuring the pans.

The cleaning practice that has been developed requires from 2 to 4 oz. of Diversey A.A.A. Cleaner per gallon of water, depending upon the condition of the pans. The pans are immersed in the cleaning solution held at a temperature approximating the boiling point of water by a closed steam coil in the washing tank. The period of immersion may vary from 1 to 4 hours. The exact time of soaking is dependent upon the degree of soil on the pans. After the soaking period, the pans should be rinsed, brushed, if necessary, rinsed thoroughly again and then dried.

It is conservatively estimated that the pans should be washed after approximately 100 bakings. To many, this might seem unnecessarily frequent, because these aluminum pans do retain their clean, bright appearance for rather long periods of time. Nevertheless, in the interests of good practice, the washing schedule given above is recommended rather than one based upon the general appearance of the pans. Because of the design of the pans which keeps them out of contact with each other, together with the much less frequent greasing required, Protektapans remain clean longer than is usual and thereby effect savings in the cost of pan washing.



Aluminum pans protected by a cold-rolled-steel frame show no warping or buckling. In (1) the lower strap of pans is two years old; the upper strap is new. In (2) the two-year old tinned pans are badly warped and dented, which causes poor contact with oven hearth. (3) "Protekatapans" are suspended in the steel frame on spring steel wires to permit an up and down movement, assuring contact with the oven hearth.

WHEN washed aluminum pans are restored to service, sticking will be encountered unless certain precautions are observed. After the pans have been dried, they should be allowed to cool to about room temperature before greasing. Greasing should be carried out only shortly (30 minutes) before the pans are needed at the panning station in the bakery. On restoration to service, just as with new pans, greasing should be carried out after each of the first three or four bakings. After that, less frequent greasings may be done.

Although the aluminum pans have been subjected daily to the normal handling in the bakeshop, they give no visible signs of wear and are surprisingly free from denting, buckling and corrosion. It is conceivable, therefore, that with ordinary care in handling, four years of usable life can be obtained without any sacrifice in baking results. This contrasts to our experience of two years with tinned pans, many of which show buckling before the end of two years.

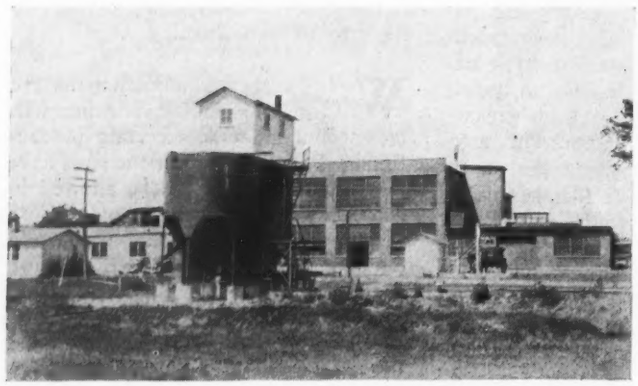
The first cost of Protektapans is appreciably higher than equivalent tinned pans, although, they cost about one-half as much as did earlier types of aluminum pans. This seemingly higher cost does not constitute an added burden for reasons already mentioned.

The nature of the construction of the pans does not require that an entire strap be discarded should one or more of the individual plans be damaged. Such pans are removable and replaceable. In most cases they can be satisfactorily reshaped over a suitable form. Also, the aluminum generally has a resale value not much less than the value of virgin metal. Thus, pans worn out through usage, or rendered useless by obsolescence or unforeseen changes in type or size of loaf, can be salvaged advantageously and replaced at a net cost considerably under the original investment.

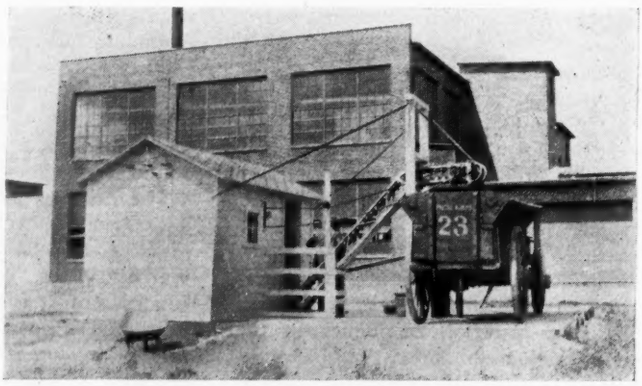
The DISPOSAL of *Food Plant*

Canners in Wisconsin cooperate with State Board of Health in research on cannery wastes treatment

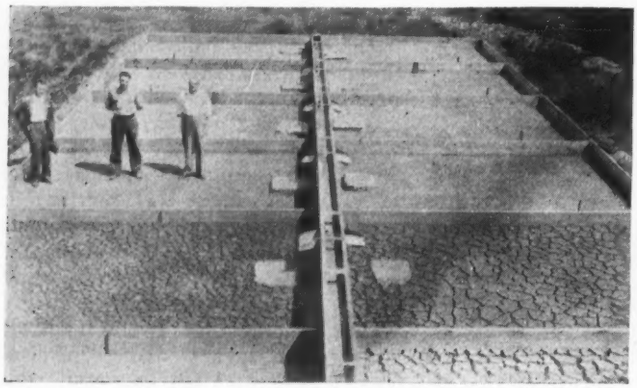
Based on an address made before the Food Technology Conference, Massachusetts Institute of Technology, Cambridge, Mass., Sept. 14 to 17, 1937



Vegetable cannery waste treatment plant of the fill and draw type, used for removal of pollutional material by chemical precipitation.

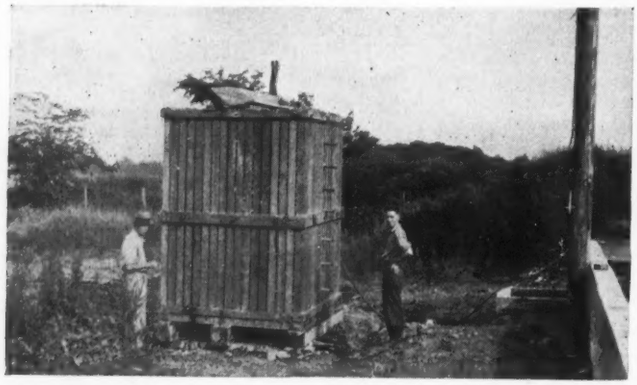


Large vegetable solids are first removed from cannery waste by 20 to 40 mesh rotary screen units. This is done, irrespective of further disposal methods, and is needed at all canneries.

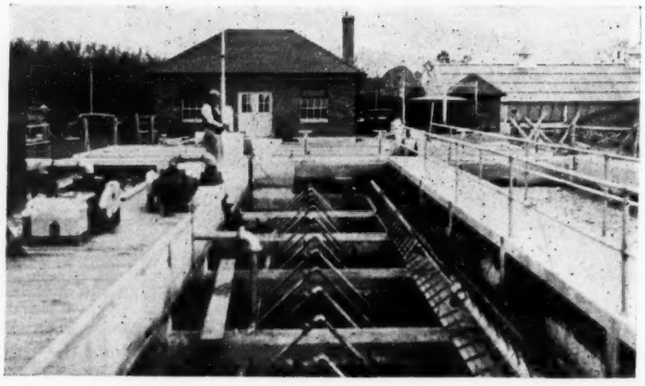


Drying beds for chemically precipitated cannery waste solids. The dried material is disposed of to nearby farms for its fertilizing value.

Some canneries are located where final disposal of screened wastes, with or without chemical treatment, can be by soil absorption or land irrigation.



Experimental trickling filter used for further biological treatment of screened and chemically precipitated cannery wastes.

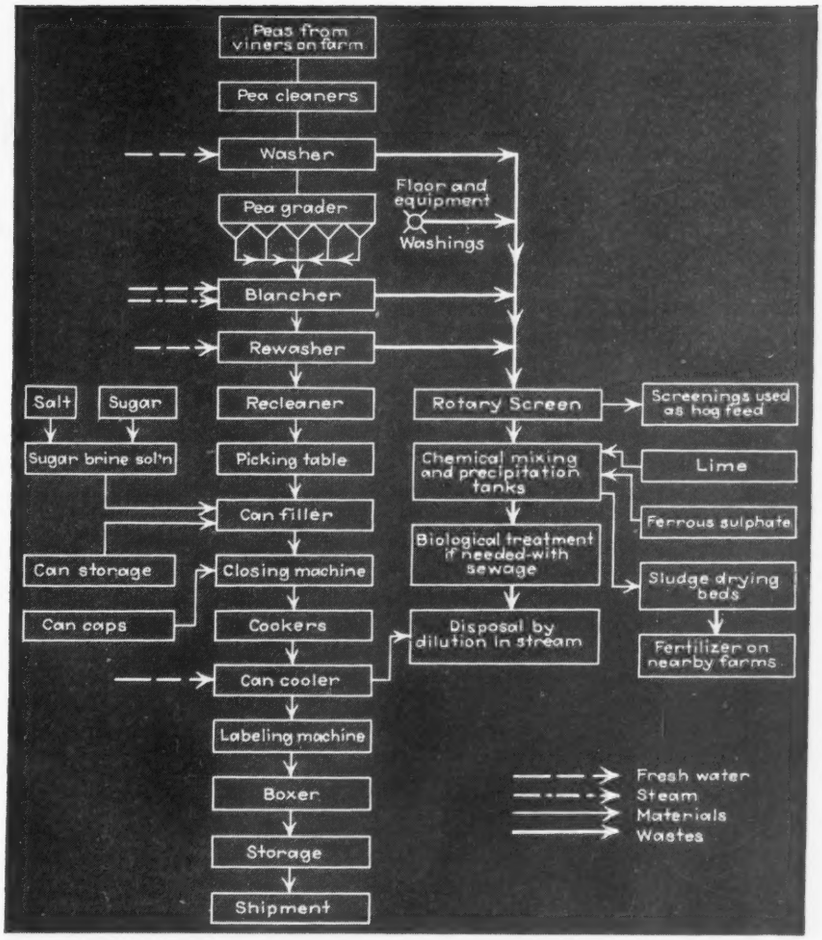


Biological treatment of cannery wastes, after partial removal of unstable organic constituents, may be provided along with the treatment of a domestic sewage at municipal disposal plants.

WASTES

By L. F. WARRICK

State Sanitary Engineer,
Wisconsin State Board of Health



Flow diagram indicating how the waste treatment system fits into the operations of pea canning.

AMONG THE MANY PROBLEMS confronting food manufacturers, that of utilization or inoffensive disposal of solid and liquid wastes is becoming increasingly important. Since many food processing wastes are much stronger than equal volumes of ordinary domestic sewage, and also frequently differ from sewage in chemical and other characteristics, discharge of these wastes untreated into public sewerage systems has caused difficulty at municipal sewage treatment works. Such wastes emptied direct into water-courses have given rise to an increasing demand by the public for proper treatment of food plant wastes.

Processes employed in the treatment of food plant wastes to remove unstable organic substances may in general be classed as (1) mechanical, (2) chemical, (3) biological, or (4) combinations of these processes. These various processes are illustrated by the developments in Wisconsin in the treatment and disposal of vegetable cannery wastes.

During 1925 a cooperative waste treatment research program was proposed to the Wisconsin Canners Association by the Wisconsin State Board of Health. It was pointed out that satisfactory methods of treating cannery wastes had not yet been developed; and, that while this was the problem of the industry, the state would cooperate in developing such methods. Since pea cannery wastes offer the major problem in Wisconsin, preliminary activities were confined to the development of practical and economical means of treating these wastes.

Wastes receiving treatment included (1) blancher effluent—resembling pea soup, (2) produce washings before and after blanching and (3) floor and equipment washings. Silage juice produced by fermentation of stacked pea vines was disposed of by soil absorption at viner stations or nearby farms. Water used to cool the canned peas was by-passed and used to dilute the treated effluent. Domestic sewage from toilets and lavatories was disposed of separately by means of a septic tank. The volume amounted to about 1 gallon for each No. 2 size can of peas that was packed.

The result of the preliminary studies were used in the design and installation of waste treatment plants during 1927 at pea canneries where very unsatisfactory conditions existed. The plants were of two general types, classified as (1) continuous flow and (2) fill and draw systems, depending on the method of handling the wastes. Operating experiences with seven treatment plants indicated that the fill and draw system, such as shown in the accompanying photograph, gave more satisfactory results, largely because of more exactness and greater ease in the control of treatment and better facilities for sludge removal.

Screening of the wastes is the first step in the removal of organic substances, and is necessary irrespective of the method adopted for further treatment. Experience has indicated that most effective results are obtained with mechanical rotary screen units having from 20 to 40 mesh wire covering.

Operating results have indicated that by the use of the chemical treatment plants the objectionable organic substances in the wastes, as measured by the oxygen demand, were reduced from 50 to 75 per cent by application of 3¼ lb. of ferrous sulphate (copperas) and 7¼ lb. of lime per 1,000 gal. of pea canning wastes; 2¼ lb. of ferrous sulphate and 6.0 lb. of lime per 1,000 gal. of wax bean wastes; and 3¼ lb. of ferrous sulphate and 6.0 lb. of lime per 1,000 gal. of corn wastes. Experience showed that thorough mixing of the chemicals with the waste and a settling period of at least one hour are required to insure proper treatment.

(*Turn to page 54*)

ENGINEERING of PASTEURIZATION

By C. A. HOLMQUIST *
Director of Division of Sanitation,
and
W. D. TIEDEMAN
New York State Department of Health, Albany, N. Y.

THE PRINCIPLE OF PASTEURIZATION was developed by Pasteur to meet a practical need in the beverage industry; namely, to check the growth of organisms causing undesirable fermentation in wines. The commercial application of the theory of heat treatment to wine was fairly simple. But with the application of this principle to milk and milk products came new problems.

The bacteriologists soon established points on the thermal death curves of various pathogenic organisms which may be found in milk. The effect of various degrees of heat on the creaming of milk, on albumin, fat, sugar, casein, enzymes and taste was also determined. It soon appeared that there was a range within which the temperature of pasteurization must fall in order to secure enough heat treatment to destroy any pathogenic bacteria which might chance to be present and yet not enough to damage the physical or chemical properties of milk. This range or zone is shown on North's Curves.

The application of the principle of pasteurization to milk and milk products on a commercial scale was first done by artisans who apparently had a poor grasp upon the engineering principles involved, if such principles were given any thought. The situation was so bad that after participating in one of the first engineering studies of pasteurizing equipment, Phelps said ". . . the lack of sound engineering in a distinctly engineering field has been conspicuous and rather deplorably so."

Proper design and construction of pasteurizing equipment requires a knowledge of physics, hydraulics, mechanics, sanitation, electricity, metal processing, strengths and qualities of materials, in addition to an understanding of the effect of heat on bacteria in milk and on the physical and chemical properties of milk.

Perhaps it is to be expected that the first pasteurizers, like the first efforts along other lines, should fall far short of accomplishing what we recognize today as proper pasteurization.

There were two general faults: first and most important, faulty design and construction leaving avenues for viable pathogenic bacteria to get through; second, faulty design and construction causing scorching of portions of the milk, damaging "creaming," encouraging the development of thermophylic bacteria and similar undesirable effects.

The last mentioned faults are of greater health significance than might appear at first because, when both raw and pasteurized milk are available, the public may, and has, turned to the use of raw milk at times when the flavor of the pasteurized milk was bad for one reason or another.

The interesting point is that the application of sound engineering principles to pasteurizing equipment has resulted in replacing the defective equipment so commonly used during the first and second decades of the commercial pasteurization of milk with equipment that will pasteurize milk without damaging flavor, creaming or any other important property. By the term "pasteurize" as just used is meant subjecting every particle of milk to a temperature of 143 deg. F., or more, for not less than 30 minutes, or to a temperature of 160 deg. F., or more, for not less than fifteen seconds in pasteurizing equipment of an approved type.

The first comprehensive engineering tests of commercial pasteurizers were carried on at Endicott, N. Y., in conjunction with bacteriological tests by Phelps, North, *et al.,* beginning in December, 1921. Many serious defects were found in the commercial equipment of that period. This served to awaken the industry as well as the health departments to the need for better engineering in the field of pasteurization. Later, Whittaker in Minnesota, Putnam and Frank in Chicago and our own department did considerable work on engineering tests of commercial pasteurizers.

You will remember that among the serious defects found in these and similar studies were:

1. Dead ends caused by such things as outlet valves located some distance from the holder. In these dead ends milk was either not heated to pasteurizing temperature or was not maintained at that temperature during the holding period.

2. Leaky outlet valves which permitted unpasteurized milk to accumulate in the outlet line during pasteurization.

3. Leaky inlet valves which permitted unpasteurized milk to drip into the pasteurizer during the holding period.

4. Unpasteurized milk held in the inlet line by atmospheric pressure when such inlet was submerged and discharged with the pasteurized milk when the holder was emptied.

5. Foam on the surface of pasteurized milk, the temperature of which was likely to be as much as 15 deg. below that of the body of milk in the holder.

6. Recording and indicating thermometers with 5-deg. scale divisions, closely spaced, which could not be read accurately.

7. Recording thermometers badly out of adjustment, with no means provided for checking them.

8. Indicating thermometers on which the metal scale had slipped, with no etched mark on the tube for resetting the scale.

9. Leaks in heat exchangers permitting unpasteurized milk to enter the pasteurized supply.

10. Continuous-flow pasteurizers designed upon the fallacious theory that actual holding time would equal the theoretical.

11. Inaccurate temperature control and lack of protection against low temperature in such pasteurization.

The remedies which engineers have developed for these defects are:

* From a paper delivered at the Food Technology Conference held at Massachusetts Institute of Technology, Cambridge, Mass., Sept. 14-17.

(*a*) Valveless outlets or outlet valves installed flush with the inner wall of the pasteurizer and so built that milk tending to leak past the valve will run to waste instead of entering the outlet line.

(*b*) Valveless inlets or inlet valves protected against leakage, and with air relief to permit milk which has passed the valve to drain into the pasteurizer.

(*c*) Foamless pumps, foamless inlet lines or automatic foam heaters.

(*d*) Recording and indicating thermometers with $\frac{1}{16}$-in. scale division per degree.

(*e*) Indicating thermometers installed in pasteurizers so as to be used both for operation and for checking the recording thermometer.

(*f*) Indicating thermometers with marks etched in the glass at the pasteurizing temperature to aid in detecting and resetting scales which have slipped.

(*g*) Safeguards against leakage of unpasteurized milk into pasteurized milk in enclosed heat exchangers, and similar protection of surface-type regenerative heat exchangers by the use of leak-protector grooves and the extension of the ends of tubes beyond the collecting troughs, using diverting fins at the end of each tube.

(*h*) Designing continuous-flow holders upon actual holding time, determined by color or similar test.

(*i*) The development of automatically controlled precision heating for continuous-flow pasteurizers.

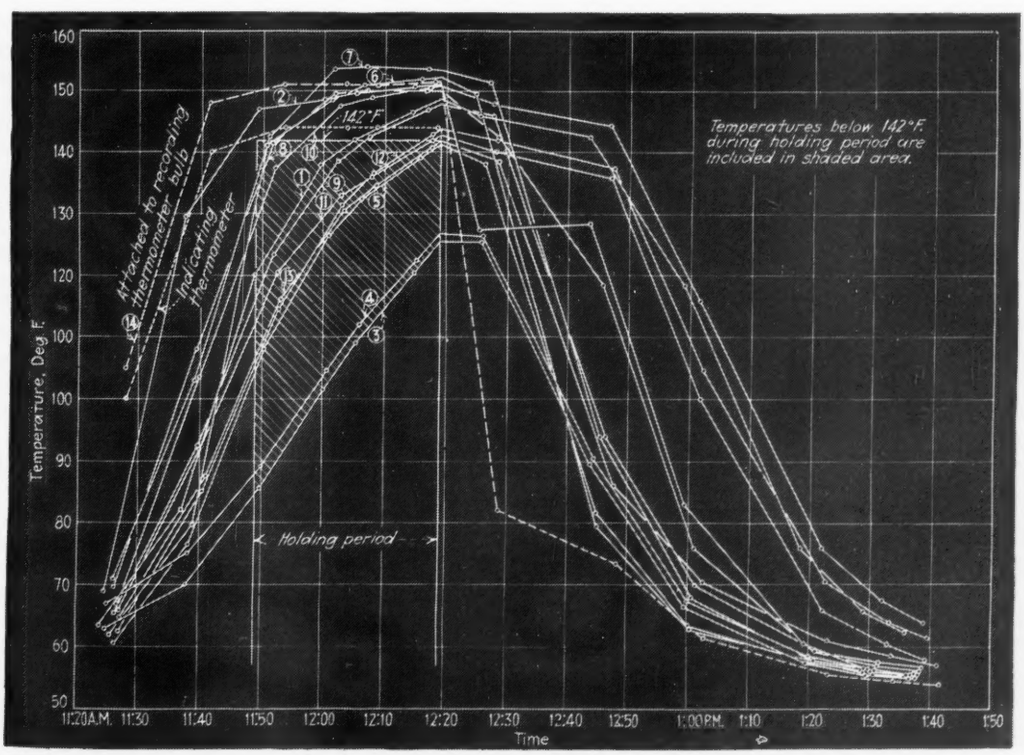
(*j*) The provision of automatic devices for flow diversion of underheated milk and automatic stops for low-temperature milk pump.

Perhaps a few concrete examples of defects in equipment will serve to bring out the engineering features involved in tests better than an abstract discussion of the subject, although it is getting to be an old story. You are familiar with the so-called "flash" type consisting of a "barrel" heater. In it, milk flowing through tubes was rapidly heated by hot water surrounding the tubes, the water being heated by live steam under manual control and without recirculation. Milk pumps used in conjunction with these were of variable speed, and no attempt was made to determine the holding time at pasteurizing temperature. The thermometers used were small, slow to react and difficult to read. The temperatures used ranged from 158 deg. F. to 165 deg. F., and the time of exposure from a few seconds to two minutes.

Engineering tests showed a great variation in temperature during operation at any predetermined temperature and similarly great variations in holding time. With the exposure of these defects and the advent of the holding type of pasteurization, "flash" pasteurization was discredited and legislated out of existence. *Good engineering might have saved this process,* as has since been demonstrated, although the equipment then in use was entirely unsuitable.

One of the outstanding examples of inefficient pasteurizers was the continuous-flow, cylindrical holder, or so-called short-flow system. When "flash" pasteurizers were banned, this was the next most economical equipment for large plants. An installation usually consisted of two cylindrical tanks, one at a slightly higher elevation than the other and so piped as to introduce milk in a downward stream at the center of the upper one. The overflow from the upper tank was similarly introduced into the lower tank, from whence the overflow went to the cooler. Because it took 30 minutes to fill the two tanks, it was assumed that it took that time for all particles of milk to flow through. The Endicott experiments, made on an improved type of shortflow holder provided with perforated inlet spreader-troughs to break the flow, showed that "some milk passed through in from ten to twelve minutes and that 25 per cent of the flow passed through in about twenty minutes or less." The reasons for this should have been perfectly obvious to the designer and are apparent to the engineer who has studied currents in streams or flow through sewage-sedimentation tanks. As a result of these and other tests, this type of holder was discredited and was soon taken off the market. Before many years, old installations of this equipment were replaced with so-called "positive holders."

Among the early types of pasteurizers were various ones designed to



Results of typical test, showing temperatures of milk in different parts of different bottles during pasteurization in an "in-the-bottle" pasteurizer.

heat, hold and cool the milk in the bottle in which it was to be delivered to the customer. This intrigued health officials because it eliminated the hazards of recontamination in cooling and bottling after pasteurization, and insured that the bottles themselves would be at least pasteurized if not sterilized.

BACTERIOLOGICAL TESTS generally showed a good reduction in plate count with an occasional unexplained increase. Engineering tests made by reading temperatures by means of a specially constructed system of thermocouples told a different story. These thermocouples were installed at different levels in bottles of milk at various locations in the pasteurizer. They brought out the fact that milk cannot be heated uniformly in an upright milk bottle without resorting to agitation. The greater heating surface in the narrow neck of the bottle per unit volume of milk to be heated resulted, under the most favorable conditions, in a differential of about 7 deg. F. in the temperature of the milk at the top and bottom of the same bottle.

A typical test of one of these pasteurizers was made by our own engineers. The result showed (see chart) that at the beginning of the 30-minute holding period, when every particle of milk was supposed to be at not less than 142 deg. F. (the legal requirement at that time), the temperature at twelve different points in various bottles varied from 85.5 deg. F. to 136 deg. F. At only one of the points selected was the temperature found to be adequate, it being 147 deg. F. At the end of the holding period, the temperature of the milk was still below 143 deg. F. at three points, being 125.5, 127 and 141 deg. F. At the other ten points, the temperature ranged from 142 to 153.5 deg. F.

This type of pasteurizer has also been taken out of plants and taken off the market. Although with good engineering, equipment could be designed to pasteurize milk in the bottle, the operation is not economical and has the commercial disadvantage of leaving a partially filled bottle after the milk contracts on cooling.

More recently, pasteurizers have been developed to subject milk effectively to a temperature of not less than 160 deg. F. for fifteen seconds or more, which tests have shown is equivalent to treatment at not less than 143 deg. F. for 30 minutes or more. This may be called a revival of "flash" pasteurization, but it has been more correctly called high-temperature, short-time pasteurization to indicate the definite holding period.

This was first attempted by the use of equipment designed to heat milk quickly to 160 deg. F. by electrical resistance during its passage between two energized, water-cooled, flat carbons spaced about 2½ in. apart. The older equipment had a fixed electrical input, and the temperature of the milk was automatically regulated by varying the rate of flow with the aid of a variable-speed pump. Provision of a control which automatically stopped and reversed the flow of milk was required before the use of the process was permitted by health officials.

Dr. S. C. Prescott and associates at Massachusetts Institute of Technology were among those to subject this equipment to critical tests. Our own department, in cooperation with the United States Public Health Service, also ran tests on a commercial unit to pasteurize quantities of milk to which human and bovine pathogenic organisms had been added. The bacteriologists collected continuous flow samples while the engineers subjected the unit to stress conditions such as failure of electric current, interruption of current in certain circuits, reduction in voltage and sudden increase in flow of milk. As a result the use of the equipment was permitted in New York State. Similar action has been taken in some other sections of the country. Many improvements have been made in this equipment since these tests were run.

Equipment built to heat milk similarly under precise automatic control by hot water has been developed and tested. Of particular interest is the plate-type heat exchanger developed for this purpose. Tests have shown that the results are equivalent to that obtained on electrically heated milk. *Apparently the degree of heat and the holding time, rather than the method of applying the heat, are the important factors.*

SOME of the earlier devices, particularly outlet valves designed to correct defective equipment, were far from being satisfactory. It was necessary to permit the use of some of these that were theoretically sound until defects developed in actual practice. The end result has been equipment that overcame the fault without developing new ones. Notwithstanding all this development it is disconcerting to find that the modern vat pasteurizer so commonly used is not as yet equipped with devices for showing positively the holding time at pasteurizing temperature.

Along with the perfection of the efficiency of heat treatment of milk have gone other important engineering developments. Many metals have been tested and new alloys developed in the effort to secure better milk-contact surfaces. Glass surfaces fused on steel are used extensively. Most modern pasteurizers have milk-contact surfaces of such material or of stainless steel. Pulleys, shafts and belts have given way to concealed motors for driving agitators. Welded joints have taken the place of soldered ones. Surfaces that need cleaning have been made smoother and more accessible. Covers have been constructed so that anything falling or dripping on them will fall on the floor instead of into the milk vats. Methods of applying heat have been improved so as to provide small temperature differentials and to avoid surfaces with hot spots that scorch some of the milk. Milk pumps have been redesigned to minimize foaming, to facilitate cleaning and to prevent damage to creaming.

Early crude attempts at commercial pasteurization resulting in scorching or in producing an oxidized or metallic flavor in milk turned consumers against pasteurization and led them to seek raw milk that tasted better. Equipment is now available that will pasteurize milk with a full factor of safety without damaging the flavor or materially diminishing any beneficial properties. This has been largely due to the work of engineers in testing, finding faults and redesigning pasteurizers.

Pasteurization of cream and other milk products is of considerable public health importance. Raw cream and ice cream made from raw mix have been found to be responsible for outbreaks of disease on numerous occasions. Most butter manufacturers have adopted pasteurization of cream to produce butter of uniformly high score by preventing foreign organisms from overgrowing added cultures.

Cheese also has been implicated in disease outbreaks. Hucker of the New York State Agricultural Experiment Station incorporated *hemolytic streptococci* from a case of septic sore throat in a Cheddar cheese and reports growth of these organisms throughout a three-month ripening period. It is desirable and possible to adapt processes of manufacturing milk products to the use of milk or cream pasteurized in the usual manner. The result is not only a safer but a more uniform product.

The more general consumption of pasteurized milk and milk products has resulted in a definite improvement in the health of the public. One of the factors making this possible has been the improvement in pasteurizing equipment.

Our recent use of the phosphatase test for pasteurization indicates that further improvement is necessary and may be expected.

Mrs. Consumer *Thinks OUT LOUD*

By MRS. BERT W. HENDRICKSON*

Chairman, Advisory Committee on Consumer Interest, New York World's Fair 1939

Chairman, American Home Department and Consumer Education Division of New York State Federation of Womens' Clubs

THE TITLE "Mrs. Consumer Thinks Out Loud" expresses three principles that guide consumer thinking at the present time. It is important to call the consumer "Mrs.," not merely because women actually do between 85 and 90 per cent of the retail buying in the United States, but because the feminine psychology that governs their buying is totally different from masculine psychology. This feminine psychology needs to be understood by the manufacturers who seek permanent consumer confidence.

The word "thinks" is important. Several years ago this thinking was confined to the intelligentsia and a few well intentioned club leaders. Manufacturers and retailers alike could, and in the main did, ignore their demands. But today, consumer thinking has spread like wildfire through all strata of income levels. Not just a few hundred, but literally millions, of consumers think. The reason is obvious. Just as surely as the way to a man's heart is through his stomach, the way to a woman's heart is through her pocketbook. Women are universally anxious to raise the standard of living for themselves and their immediate families. When they realized that wise buying would help them accomplish such a raise, they started asking the obvious questions: "What am I buying?" "What is it made of?" "How can I use it to the best advantage?"

The words "out loud" in the title are important too. Consumer thoughts are no longer distant murmurings. They are finding adequate and forceful expression. The future generation is learning consumer education in the schoolroom. The present one is reached by numerous books, pamphlets and magazines; by forums and conferences; by government agencies; by college-extension and home-bureau classes; by club and institute programs.

Consumer interests have reached the stage where they cannot longer be ignored. Up to the present, the majority of the leaders and teachers in the movement have been high-principled individuals, with a genuine interest in the public good. While the movement is still flexible, there is a splendid opportunity for manufacturers to help in this education of the consumer by clearly stating their problems. In this civilized world, your problems are our problems and our problems should be your problems. No real progress will be made—constructive, not punitive, progress—until manufacturers, retailers and consumers recognize that this is a mutual problem whose only permanent solution is through cooperation.

So far, the conclusions have been general and would apply equally to all consumer goods. Let us now consider the food industries specifically. For our mutual satisfaction we can honestly say that the food industry is the best organized from the consumer standpoint. Partly because of your own high standards and partly because of government regulation, the consumer receives better information as to the quality and use of food than in any other branch of buying. Food manufacturers have a decided advantage. We all must eat. We may live in trailers, tents or shacks and wear a minimum of clothing, but every one of the 127,000,000 people in this great country needs food. Which of you manufacturers sell that food depends on a large number of factors, many of them psychological.

Perhaps the most important of these psychological factors is the fact that women consumers tend either through inertia or loyalty to stick to tried and proven products unless aroused by some special dissatisfaction. Manufacturers might better utilize their facilities in research to discover new and various uses for familiar products than to follow their present tendency to add constantly to the multiplicity of new products. An apparently contradictory psychological factor is women's love of change. Meal planning is a monotonous business for most women, and ways of varying that monotony are welcomed. This factor can also be handled by discovering new and varied uses for present products.

Two examples can be cited from within your own group. One is the campaign for the use of Kraft cheese in cheese souffle, in salmon croquettes with cheese sauce and in other ways—each pictured so appetizingly in colored advertisements that the creative instinct dominant in most women was adequately aroused. This campaign, the recipe booklet on uses for Kraft cheeses, the demonstration by Kraft's home economists throughout the country and the cooperation of newspapers and magazines in publishing one or more of these in their food pages have proved that this particular corporation believes in the soundness of this consumer appeal. Another example is Borden's Eagle Brand condensed milk. When production costs curtailed its consumption, research on additional uses, which led to the issuing of "Magic Shortcuts," aroused the consumer to the possibilities offered by this familiar product.

Another factor is women's hatred of failure and resultant waste. All recipes on packages and in booklets should be tested for accuracy. Consumer confidence is built in such cook books and pamphlets as are compiled by General Foods. It is equally true that consumers have been permanently lost through the inaccuracy of the recipes on some packages. In this connection, another bit of psychology should be mentioned—women like illustrations that show how the finished product should look. These also insure more care on their part in following directions. A companion factor is women's desire to follow the easiest way—we have heard so much of labor saving that we have universally adopted shortcut methods. Here, too, research in your home economics laboratories and kitchens is the best solution.

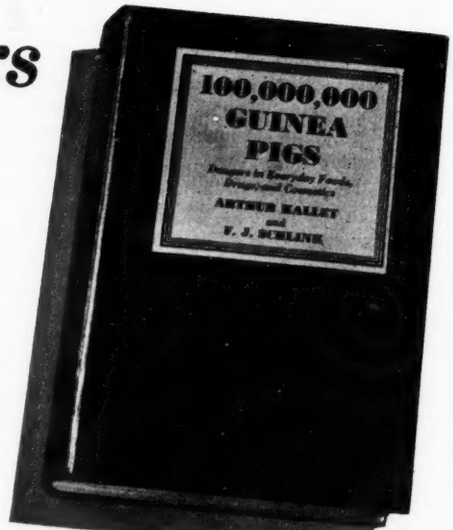
A mistaken idea among manufacturers is that women always want the best. This is true to a certain extent in the clothing and house furnishing fields, but it is not true in food. Consumers want to be assured of wholesomeness and safety. The best is reserved for company or special occasions. For daily use a lesser grade is all that the average consumer can afford.

(*Turn to page* 59)

* From a paper delivered at the convention of Associated Grocery Manufacturers of America, held in New York on Nov. 30.

It's Time to TALK FACTS *to Food Consumers*

By IVAN C. MILLER
Distribution Editor



FOOD MANUFACTURERS, together with other manufacturers of consumer goods, have too long been silent to the damning testimony, false though it may be, with which they have been indicted before their customers, the consumers. The first indictment to obtain a strong national prejudice to manufacturers of consumer goods was "100,000,000 Guinea Pigs," soon followed by an avalanche of similar publications. Among these were "Skin Deep," "Your Money's Worth," "The Popular Practice of Fraud," "American Chamber of Horrors," "Poison, Potions and Profits," "40,000 Guinea Pigs' Children." Many of these have been best sellers or near best sellers. Many of them are still in popular demand.

Manufacturers of consumer goods have made no answer to these charges and similar ones made periodically by *Consumers' Research* and *Consumers' Union.* This may have been because of manufacturers' indifference. It may have been because of the belief that consumer interest was but a passing fancy. It may have been because of the fear of creating "persecuted martyrs" of their tormentors.

These indictments have created the illusion that all advertising misrepresents, that it is a costly expense borne by the consumer without benefit or value. Against the food manufacturer is lodged the additional indictments that not only is his advertising false and misleading and an unnecessary expense to consumers, but that some of his products are poisonous, of inferior quality, misbranded and distributed at an exorbitant profit.

In 1927 when the first best seller offered criticisms against manufacturers, it was hoped there would be little interest or concern among consumers. However, consumers were receptive. Persecuted martyrdom, real or fancied always captures public imagination. The consumer movement, once born, enjoyed mushroom growth. It has grown until it is now a well organized body comprising an estimated 5,000,000 members of women's organizations (the men's auxiliaries are less impressive). Among these groups are American Home Economics Association, American Dietetic Association, National Consumers' League and National Women's Trade Union League. Even the Government supports the movement, apparently wholeheartedly. The Department of Labor, which publishes *Consumers' Guide,* lends credence and authority to publications such as *Consumers' Research, Consumers' Union* and *Consumers' Digest,* by reference to them as authoritative sources of information. Little wonder, then, that the case against manufacturers of consumer goods is taught in the public schools to the manufacturers' customers of the next generation.

Among the first to enter the arena in defense of advertising is Crowell Publishing Co., which has announced the establishment of a consumers' division. This department will conduct research on consumer goods and furnish educational consumer information.

RECENTLY, consumer groups themselves have given manufacturers the opportunity of stating their case in open forum. Mrs Bert Hendrickson, in an address before the recent convention of the Associated Grocery Manufacturers of America, extended manufacturers an invitation to meet with consumer groups in an honest attempt to solve mutual problems.

An attempt to bring consumer and advertiser together has been fostered by Advertising Women of New York, Inc., which is sponsoring a forum where manufacturers, advertisers and consumer can meet and debate questions, until now submitted to the consumer only by biased agencies. Before such a forum held in December, Paul S. Willis, president of Associated Grocery Manufacturers of America, presented the grocery manufacturer's viewpoint in the discussion "Do the Consumers Get What They Pay for in Foods?"

This is certainly a step in the right direction. Food manufacturers should henceforth make a determined effort to be represented as often as possible before consumer groups. They should provide intelligent speakers who can present an honest case for manufacturers.

Possibly one reason why grocery manufacturers have so long delayed in placing their case before the consumer is because some of their own houses are not sufficiently in order. In the current November issue of the monthly publication of the U. S. Department of Agriculture, "Notices of Judgment under the Food and Drug Act," are recorded more than 70 judgments returned against food manufacturers for adulteration and misbranding of food products. Facts from this bulletin have wide distribution among consumers. Until the practices which make possible these judgments are outlawed, food manufacturers can scarcely hope to present a strong, convincing case before consumer groups. If allowed to continue, these practices will stimulate consumer group agitation for legislation which, rolling on Washington as a tidal wave, will carry drastic laws into enaction. These may be to the best advantage of neither manufacturer or consumer.

Policing from within can be made painful only to the real offenders. Policing from without may be disastrous to the whole industry. Food manufacturers—right now is the time to act.

Merchandising HINTS AND HURDLES

Device to Dress Up Cartons

A NEW DEVICE which measures the tape used in sealing shipping cartons has recently been placed on the market. Carton users can have the correct tape length printed on cartons they use, can set the tape-measuring device for these correct lengths, and thereby not only save by the elimination of tape waste, but also improve the appearance of the cartons by making them uniform in appearance. This is particularly important where cartons are used for display purposes in retail outlets, an application of the carton which is rapidly increasing with the movement towards more and more self-service stores.

Sampling Increases Sales

THE HILLS BROS. Co., New York, has been offering to the trade "sampler" combinations consisting of "Dromedary" dates in ¼-lb. packages, wrapped together with either ¼-lb. packages of Dromedary coconut or Dromedary tapioca, to be retailed at attractively low prices. In some areas this sampling has been responsible for an increase of as much as 200 per cent in repeat sales of the larger size packages.

Cash and Carry vs. Service

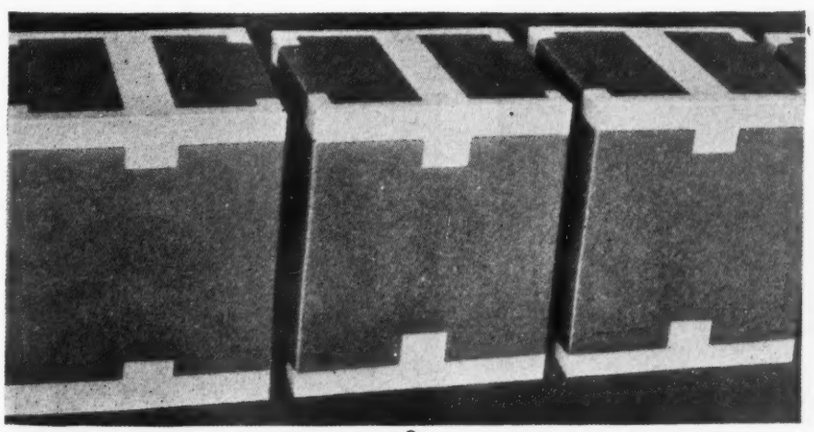
POSSIBLY, after all, the independent service stores have not been wrong all these years. The chains with their cash-and-carry system have long admitted their efficiency, proudly pointing out the savings passed on to consumers by the elimination of two service-store functions—credit and delivery service.

At least one of the big chains is now building up a strong case for the service store by extending credit to a few of the most credit-worthy of its volume-purchasing customers. The once forbidden privilege of extending credit at the manager's discretion is now permissible in some A. & P. outlets. The risk, however, is still not that of the parent company, but that of the local store manager. Some units are now privileged to offer delivery service. However, delivery service is not offered free of charge with any and all purchases, but usually only with purchases above a stipulated amount. Purchases below that amount are delivered only for a delivery charge. This charge, ten or fifteen cents, often amounts to more than ten per cent of the purchase.

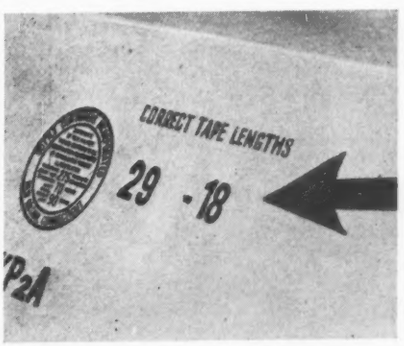
The cash-and-carry stores are now flanked on one side by the service store and on the other by the supermarkets and self-service units. The low prices in A. & P.'s own self-service markets, as well as competing self-service markets, have probably been responsible for the granting of unprecedented privileges to a few A. & P. units which suffer most from self-service store competition. Such markets are allowed to set their own prices at the discretion of the manager. The basic principles of the chain store cash-and-carry system are no longer basic. These principles are in the process of flux.

Markets Not Surfeited

A MARKET STUDY of a representative American city made by *True Story Magazine* indicates that although the bread baker has expanded almost to the limit of his market, there is an opportunity for appreciable expansion in the markets for other food products studied. Of the 79.9 per cent of the families in this typical city who bake at home, only 8 per cent bake bread. But 49.5 per cent bake biscuits, 94 per cent bake pies, 93 per cent bake cakes, 74 per cent bake cookies. The findings of the study do not indicate whether housewives choose to buy bakery bread but make their own pastry because of the relative difficulties and time involved in the two operations, or because of the relative quality of the two types of products. The manufacturers of jams and jellies have a market in which there is ample room for expansion. The study indicates that 56.3 per cent of the families in this representative city preserve their own jams and jellies. Forty per cent of these prepare more than 50 glasses of jelly, 42.3 per cent put up more than 30 jars of jams.



Uniform taping with measured lengths of tape creates an economy in tape and improves carton appearance.



The tape lengths can be conveniently printed on the carton by its maker, to serve as a guide to the shipping department in cutting tapes the correct length.

New PACKAGES

Tropical Fruits in Rum

"TRADE BORNE" guava in rum and diced or crushed pineapple in rum are being packed by the Trade Winds Co., St. Thomas, Virgin Islands, for the American trade. These products, in 5-oz. and 10-oz. glass jars, are offered to the consumer through retail outlets. Crushed pineapple in rum, in 1 gal. and ½ gal. jars is offered to the ice cream manufacturing trade to be used either as an ingredient in preparing pineapple rum ice cream or as a crushed fruit flavoring to be served on ice cream at the soda fountain. Both the guava and pineapple in rum are suggested as ingredients in cocktails, punches, fruit-cups and summer drinks; as topping for frozen desserts, puddings, shortcakes; and as filler for sweet omelettes.

The Proof of the Pudding

IN HER ADDRESS before AGMA, in session in New York (see p. 25), Mrs. Bert Hendrickson, speaking for the consumer—the housewife—made this comment, "Women consumers tend, either through inertia or loyalty, to stick to tried and proven products unless aroused by some special dissatisfaction. Manufacturers might better utilize their facilities in research to discover new and varied uses for familiar products than to follow their present tendency to constantly add to the multiplicity of new products."

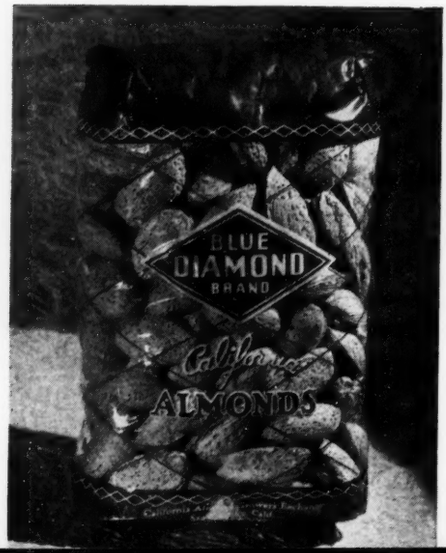
At least one food manufacturer has recently proved that this viewpoint does not hold in all cases. Crosse & Blackwell, Baltimore, manufacturer of food products for more than two centuries, has recently added to its line of nearly 200 items the new product, "Date and Nut Bread," packed in a key-opened can. Among the multitude of food items distributed by Crosse & Blackwell to the American market, its Date and Nut Bread commands the spotlight in sales volume. The cracker barrel and the sugar bin are antique because Mrs. Consumer does not always stick to tried and proven products.

Caramels in Seven Flavors

A NEW transparent cellulose wrapped package of caramels has recently been placed on the Eastern market. This package of "Dairy Fresh" caramels, product of Kraft-Phenix Cheese Corp., Chicago, contains 56 separately wrapped caramels per lb., in seven flavors. The flavor of each row of caramels is indicated by the flavor name printed or a paper flap, coffee, raspberry, rum, licorice, vanilla, chocolate and coconut. These boxes of caramels are offered to retail at 25 cents per half pound box, 45 cents per pound box.

Almonds Follow Trend

THERE HAS BEEN a marked trend of late to packaging foods previously sold in bulk. This trend takes advantage of the tendency of the housewife to respond to impulse and buy that which is prominently displayed. Packaging



AND PRODUCTS

induces display and usually creates a greater impulse to buy. California Almond Growers' Exchange, San Francisco, is this year packaging its "Blue Diamond" brand California almonds in a transparent cellulose bag with marine blue foot and cap.

Bold Method Revived

EARLY IN DECEMBER customers of Maple Hurst Dairy, in Connecticut, found delivered with their milk a small container of "Bosco" milk amplifier and a standard 1½-lb. retailer's shelf package of the same product. A cardboard collar about the small package informed customers that they were receiving a free sample of Bosco chocolate-flavored milk amplifier. The card also requested customers to try the free jar after which, if they did not wish the family size jar, to return it to the driver for credit. Most of the Dairy's customers no doubt welcomed the free sample from the company whom they regularly patronize and in whom they have confidence. Many no doubt purchased the family size package. A few of the Dairy's customers, however, may have been scandalized. They were those who had read in *Readers Digest* of the Better Business Bureau's disapproval of the practice of delivery of merchandise without order to be returned for credit if not desired.

New Variety Pack

A. D. COVICKS, Swedish packer of "Party" brand "Gaffelbitar" herring tidbits, has expanded its line from a single herring tidbit pack to five displayed in a single display carton. The new display carton contains herring tidbits packed in dill, in wine sauce, in fruit sauce, in lobster sauce, with a fifth package included containing anchovies. The assortment retails in this country for 50 cents.

Shrimp in Tin and Glass

BROKERS in a few selected markets have obtained favorable reaction to "Pel-La-Co" hors d'oeuvres buffet brand of shrimp packed in both tin and glass. The shrimp in the glass pack regimented into an attractive design should be effective in inducing impulse sales when arranged for point of sale display.

New Labels for Fillets

GORTON-PEW FISHERIES CO., INC., Gloucester, Mass., has recently placed a new label on all of its many fish fillets, using the trade name, "Gorton Fresh Frosted Fillets." Frozen fish fillets, whether wrapped in parchment or transparent cellulose, carry the new label, as do waxed cartons for displaying wrapped fillets.

Threat to Tin and Glass?

THE AMERICAN CONSULATE at Leipzig, through the Chemical Division of the Department of Commerce, reports the development in Germany of a container for preserved foods made from transparent plastic materials. Although the sides of this container are transparent, the top and bottom are made of tinplate. The report states that this new container may be handled as though it were made entirely of tinplate. This new container may have an immediate application in Germany. But the plastic material, acetyl cellulose, oil-lacquer treated, will be a threat to can and glass container makers in this country only when the plastic is produced in this country.

Stainless steel cuts 50 per cent off the weight of this trailer.

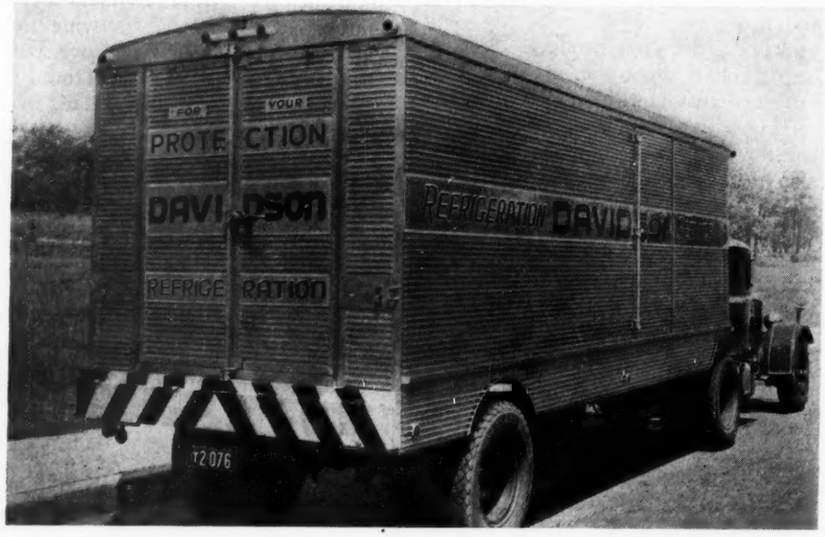
Stainless-steel Bodies *Increase Payload Capacity*

Reduce weight, resist corrosion, have high advertising value

IN THE SEARCH for lighter, yet stronger, body materials to increase the payload capacity of trucks of all sizes, stainless steel is increasing in popularity because of its advantages of light weight, high tensile strength, durability, ability to resist corrosion and a permanent outside finish which does not require painting.

Stainless steel first came into prominence in the transportation world when used by the Edward G. Budd Co., Philadelphia, in the manufacture of its new light-weight, streamlined railroad trains. Now the same company is using the same medium in the field of automotive transportation, as exemplified in the two trailers pictured and described on these two pages.

The semi-trailer body shown at the top of the page is one of two identical units built for the Davidson Transfer & Storage Co., Baltimore. It will supplement that company's fleet of refrigerated trailers engaged in hauling such food products as cheese, mayonnaise, yeast and meats between Baltimore and New York City.



Rear view of stainless-steel, refrigerated trailer, showing the ice-box type of rear door and the arrangement of the fluted Allegheny strips, spot-welded for lightness. The exterior sides and roof are in the bare metal, which requires no paint or varnish.

The body is 24 ft. long and is mounted on a light-weight, fully automatic Fruehauf trailer developed especially for this unit. The weight of the trailer chassis and body is 8,525 lb. The body alone weighs 4,675 lb., of which 2,265 lb. consists of insulation and refrigeration units.

The exterior covering of the body is made of very thin sheets of Allegheny metal. These are fluted to give greater rigidity. They are welded together by the Budd system of spot-welding. This process entirely eliminates riveting and results in a trouble-free weld, producing, in effect, a one-piece body permanently welded together.

The floor of the body is covered with a one-piece stainless-steel-pan with 6-in. flaps extending up around all the edges. This permits the floor to be flushed as often as necessary without water getting into the balsa and spun-glass insulation used in the floor. The flushing fluid is drained off to the ground through four self-bailing, sealed drains, one in each corner.

The body proper is divided into three compartments by means of two transverse bulkheads or partitions. Kapok insulation, because of its light weight, is used in the body sides, ends, roof and partitions.

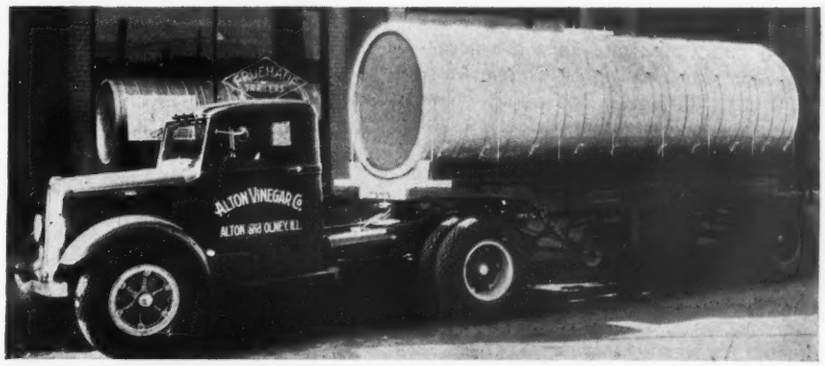
The refrigeration system is of the "ice-fin" type, as made by Fitzgibbon & Crisp, Trenton, N. J. It consists of three separate cooling units using dry ice as a refrigerant. The dry ice is placed inside of a hopper which has fins on the bottom and front. A small electrically driven fan forming a part of the cooling unit draws the air over the fins, cools it and then circulates it through the body compartments. By this arrangement, constant temperatures can be maintained within narrow limits, although the temperature in each compartment may vary according to the requirements for the foods carried.

The exterior panels of the body and also the roof are in the bare metal, unpainted and unvarnished. The high reflectivity of the polished surface minimizes the penetrating effect of the sun's heat. Washing and rubbing serves to increase the polish of the metal.

Built on the same general principles as the Davidson trailer body, that on the cab-over-engine Autocar owned by the Hanscom Baking Co., Philadelphia, also has exceptional advertising value because of its unique appearance.

Truck Delivery *Boosts Vinegar Sales*

Tank trailer replaces tank car and permits service to more customers



A White tractor and Fruehauf trailer provide the mobility for this 2,300-gal. cedar tank used for the delivery of vinegar out of Alton, Ill. It replaced a 5,000-gal. tank mounted on a railroad car and helped get new off-route rail customers and others who couldn't handle 5,000-gal. deliveries.

ALMOST UNUSUAL tractor-trailer installation is the 2,300-gal. tanker used to transport vinegar in bulk from the works of the Alton Vinegar Co., Alton, Ill. It replaces a 5,000-gal. tank mounted on a railroad car.

The tanker is used to transport vinegar from the company's main plant in Alton to its bottling works in Olney, Ill., a road distance of 150 miles, one way. However, because of the smaller size of the trailer tank, its use has permitted the company to serve a large number of customers who formerly had to be passed up because of their inability to handle 5,000-gal. deliveries.

The greater flexibility of the motorized, unit, its ability to move irrespective of railroad schedules and its further ability to make off-route deliveries to points not on the rail line have combined to make the installation a most satisfactory and profitable one.

The tank, which is shown in the accompanying illustration, is made of cedar. It is steel-banded in the usual manner of tank construction and is fastened to the trailer frame by means of eight steel loops extending over the top and down through the trailer bed on both sides.

Vinegar is loaded into the tank through a manhole at the top from storage tanks at the plant. At its destination, it is unloaded by gravity through a discharge valve at the bottom.

Another stainless-steel body, this time on a bakery truck used in Philadelphia. Again unpainted and unvarnished, the applied metal lettering and the silver sheen of the metal itself serves to produce a body of unusual appearance and advertising value.

Cost of Distribution *By Truck*

How great the expense is . . . Ways of reducing it

NO EXECUTIVE questions the necessity for keeping truck operating costs in line. But doing it involves an understanding of what the costs should be and what to do if they are too high. The following symposium presents information helpful in that regard.

Many Factors Involved

The operating cost of any vehicle is affected by many things. It may be the driver, it may be the type of load which is being carried. The small, compact, heavy load will cause less wear and tear on a car than a load of similar weight which has a large bulk and causes more sway. Road conditions, too, have much to do with the cost of operation. A truck carrying the same load may be operated around the metropolitan area on good cement roads 90 per cent of the time. On the other hand, this same truck might be operated in the mountains of West Virginia or elsewhere over comparatively poor roads, which would make for a tremendous increase in the cost of operation.

The human equation enters into everything to a large degree, particularly in the driving of a car. Some drivers will use enough gasoline in starting a truck to operate it for some time. Also, individuals sometimes use brakes excessively or drive too fast over poor roads. There are a hundred and one things which would enter into this category.

Analysis by modern instruments is of considerable help in adjusting carburetors, etc.; but such tests have to be made under given conditions which do not always exist when the truck is on the road.

A few years ago we had a fleet of 550 one and 1½-ton trucks. Groups of these vehicles were operated from central garages. They were all of the same make. It so happened that in one of the cities we had a group of eighteen trucks, all of which were purchased at the same time. Each one covered a given route each day. Certain of these trucks showed a rather low mileage per gallon of gasoline. In checking these particular trucks, we found it was due entirely to the large number of stops made for delivery of merchandise.—C. L. JONES, *Automotive Division, General Foods Sales Co., Inc., New York, N. Y.*

Costs Vary With Weight

Briefly, the operating cost per mile—without driver's labor—in the 10,000 to 12,000-lb. (gross vehicle weight) class will average from 5 to 6 cents per mile, depending on whether the route is long or short. As the g.v.w. increases, the operating cost per mile likewise increases in approximately direct ratio, as follows: 12,000 to 14,000 lb. will average from 6 to 8 cents, depending on mileage; 14,000 to 16,000 lb., 8 to 10 cents.

It has been often repeated that the most important nut on the truck is the one behind the wheel. We find the individual driver plays a very important part in the control of operating costs; primarily, from the standpoint of damage to equipment through accident. We find it decidedly beneficial as far as possible to assign a driver to a given truck. This eliminates divided responsibility.

Distribution QUESTIONS CLUB

We are using modern motor analyzers quite extensively and find that they are imperative in obtaining high operating efficiency from a fuel standpoint.

If certain vehicles give abnormally low gasoline mileage, even though tested and approved for efficiency and operated on normal routes, in all probability the difficulty can be traced to driver inefficiency. Staying unnecessarily long in the gears, unnecessary idling of the engine at delivery stops and gunning the engine unnecessarily in maneuvering all tend to produce higher cost mileage.—F. L. FAULKNER, *Automotive Department, Armour & Co., Chicago, Ill.*

Normal Cost 3c a Mile

For trucks up to 2-ton in capacity, we consider 3 cents a mile is a normal operating cost.

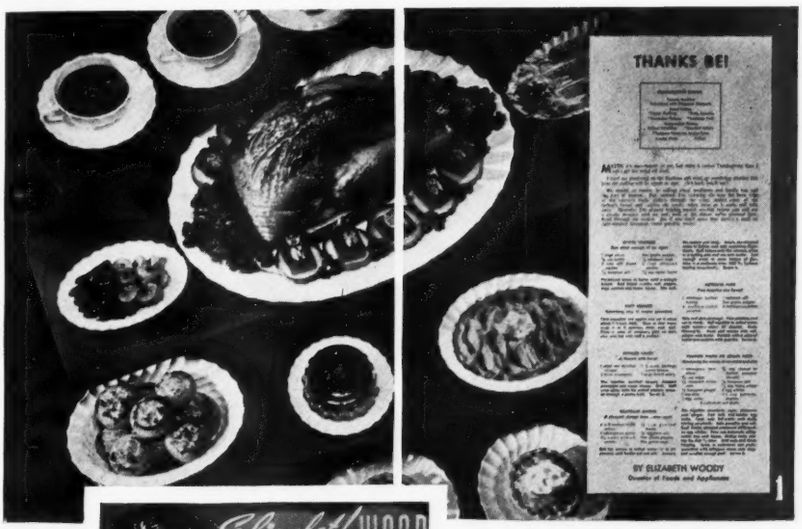
If the operating cost of a truck or commercial car is too high, the most effective means of reducing it is to check the efficiency of the motor, look for overloading and check the "roughness" of the driver.

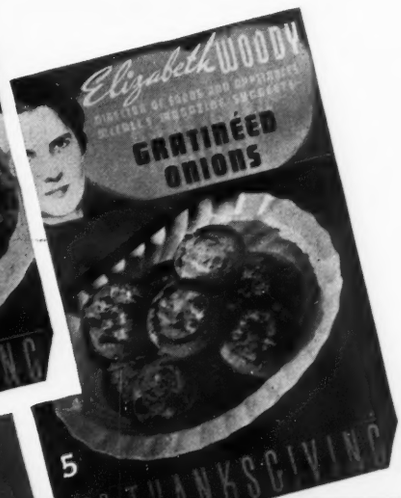
The driver has a very great effect upon operating expense, and it may be said that he can influence costs to the extent of 30 per cent.

In our opinion, modern motor analyzers, such as those which analyze the exhaust gas, are helpful in reducing operating costs. However, we cannot comment conclusively on this.

If certain vehicles of a fleet fail to obtain the expected gasoline mileage, even though of the same make as vehicles giving satisfaction, though tested and approved for efficiency and though operated on normal routes, the truck trouble is likely to be found in the driver.—A. J. CLAXTON, *Manager, Meadow Gold Dairy Products, Lima, Ohio.*

SIDELIGHTS on Impulse Sales





POINTED OUT in the November issue of FOOD INDUSTRIES were case histories indicating that voluntary chains as well as corporate chains had successfully used the point-of-sale influence of the food pages of the women's magazines to stimulate sales. In each case it was pointed out that merchandising events were built around these food pages and the food items which they featured. At least some of the organized groups have evinced an interest in building a merchandising program to support the point-of-sale influence of the women's magazines, using the reprinted pages in poster form, mailing and passing out reprints with recipes, preparing feature displays in their windows and inside, and further supporting the campaign by handbills, newspaper advertising and radio announcements.

Independent Grocers Alliance capitalized on the influence of the food

(Continued on page 36)

1. Food dishes illustrated on magazine food page at top were enlarged in color to make the posters shown below.

2. Ruby Squares made from apples and cranberry jelly. Used to sell turkey and cranberry jelly.

3. Pumpkin pecan ice cream tart made of pumpkin, nuts and ice cream. Used to stimulate sale of canned pumpkin and nuts.

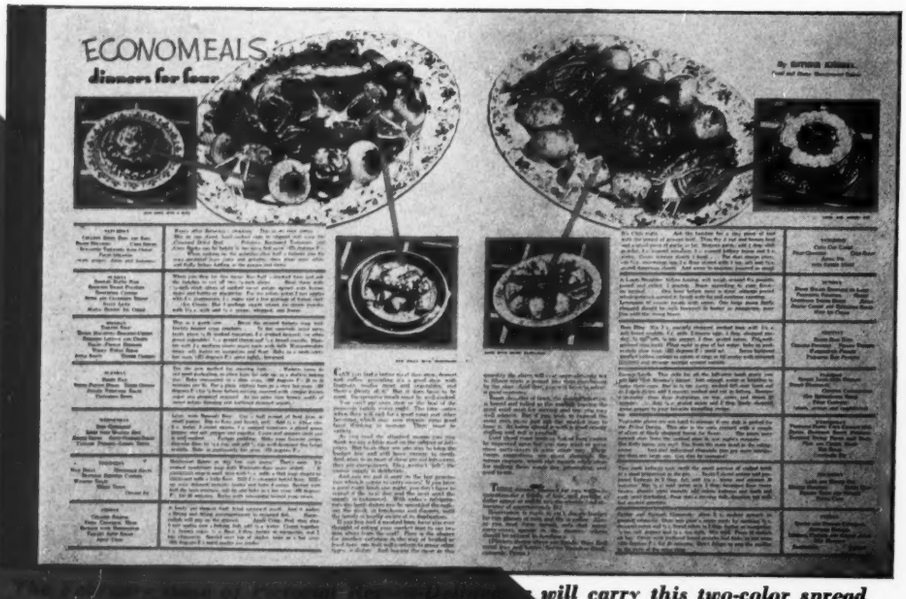
4. Rutabato Fluff used to sell fresh rutabaga.

5. Gratinéed onions used to sell canned or fresh onions and grated cheese.

FOOD

Color pages from the forthcoming February issue of Good Housekeeping

Woman's Home Companion will carry this full-color food page in the February issue



will carry this two-color spread

Full-color spread from the

PAGES

from February Women's Magazines

Woman's Home Companion: full-color spread illustrating the ingredients for the preparation of chicken a la king, including cold chicken, mushrooms, pimiento, and toasted bread. Posters bearing this reprint suitable as point-of-sale stimulant for canned or frozen chicken, pimientos, mushrooms and bakery bread.

Ladies' Home Journal: full-color spread illustrating and providing recipes for dishes, the ingredients of which are canned crabmeat, canned lobster, canned fruits, grapefruit, orange, grapes, peaches, cherries, or canned fruit cocktail, canned brussel sprouts and canned asparagus. Spread suitable for manufacturers of these products.

Pictorial Review-Delineator: two-color spread under the caption "Economeals" illustrates and furnishes recipes for baked ham and baked lamb and dishes to be made from the left-overs throughout the remainder of the week, especially suitable for packers of cured ham and fresh lamb.

McCall's: full-color spread illustrating a table centered about a baked ham. Surrounding the baked ham are pineapple rings, bearing peach halves filled with cherries. Illustrated on the table is a dish of canned vegetables, a dessert of California fruits, and cups of cocoa. This food page may be used to stimulate the sales of cured ham, canned peaches, canned pineapple, canned cherries, canned vegetables, corn and beans, dried prunes, coconut and cocoa.

Good Housekeeping: full-color spread picturing a Valentine buffet and George Washington Bridge luncheon. Illustrated are a bowl of apricot punch, sandwich spread, "Valentine cakelets" and a dish of cherries. Display suitable especially for stimulating sales of canned apricots and cherries.

• ***Reprints of these pages mounted to make posters may be obtained from the respective magazines before or by the time the magazines reach their readers*** ***(see p. 36).***

February issue of McCall's

Full-color spread which will appear in the February issue of Ladies' Home Journal

pages of women's magazines by staging a merchandising event centered on dishes made with dried fruits (*Food Industries,* November, 1937). This one-week event netted sales to I.G.A. members of close to 3,000,000 lb. of dried fruits. I.G.A. has again made use of this idea, by staging a Thanksgiving merchandising event, prior to the holidays. The theme of this event was Thanksgiving dishes suggested by the food pages of a woman's magazine.

Combining the recipes suggested by two different women's magazine food pages, I.G.A. had posters prepared illustrating each dish, enlarged. These were displayed in 6,000 I.G.A. stores during the event. Handbills with prices of items necessary for preparing the magazine's suggested food dishes were distributed to 2,500,000 homes. Printed recipes of all eleven of the magazines' suggested dishes were offered free to all who called for them at the store. Over 600,000 leaflets bearing these recipes were given out in I.G.A. stores during the week.

The concerted merchandising effort of any group of stores behind a product will increase that product's sales. Add to this effort the point-of-sale influence of the women's magazine food pages and sales are still further stimulated.

Each month FOOD INDUSTRIES publishes illustrations of the forthcoming food pages of the women's magazines so that manufacturers whose products are illustrated and described may obtain posters bearing reprints for distribution to retailers concurrent with the magazine's distribution to its readers.

Mounted reprints of these food pages (single pages on 14x22 in. poster board, spreads on 28x22 in. poster board) may be obtained from the magazine ready for use at the following prices:

SINGLE PAGE

1,000 to 1,999 inclusive	15¢
2,000 to 2,999 "	12¢
3,000 and over	10¢

TWO PAGE SPREAD

1,000 to 1,999 inclusive	25¢
2,000 to 2,999 "	18¢
3,000 and over	16¢

Each poster will carry the printed line "as seen in the February issue of ..... magazine." The manufacturer's selection of caption or "selling slug" such as "Try This Unusual Dessert Tonight", "Good Housekeeping Suggests This Dish", etc., will be printed at the top of the poster. No poster will bear the name of the manufacturer or his trade brand.

1. The food magazine page in center together with the one illustrated on page 33 formed the basis of this merchandising event.

2. Posters displaying this page were used in window and counter displays.

3. The eleven recipes appearing on the food pages were printed on leaflets which were distributed in the stores.

4. Hand bills pricing items featured on the magazine food pages were distributed to homes in the neighborhood of the stores.

Determining the Viscosity of Chocolate Coatings

Dorchester, Mass.—I have read with great interest Dr. Leo Freundlich's article on chocolate coverage, published in the November issue of FOOD INDUSTRIES, page 630.

Dr. Freundlich's method is somewhat different from the method adopted by the majority of laboratories checking and standardizing the viscosity of chocolate. You undoubtedly know that the method used by most laboratories is the MacMichael viscosimeter, No. 27 wire, 20 r.p.m., chocolate heated to 115 deg. F. for milks, or 120 deg. F. for dark sweets, and cooling to 100 deg. F., at which temperature the test is made. The reading is taken with a 2-cm. diameter plunger immersed 2 cm. in the chocolate, and the reading is multiplied by two. It is customary to take the readings of "icecoats" with the plunger immersed 4 cm. in the chocolate. For viscosities of over 450, a No. 22 wire is used and the results multiplied by twenty if the plunger is immersed 2 cm., or multiplied by ten if immersed 4 cm.

The reason the chocolate is heated to the temperatures mentioned is to be sure that all the fractions of the cocoa butter have been melted thoroughly. Since the melting point of cocoa butter may vary from 89 to 93 deg. F., it is necessary to test the viscosity of the coating at a temperature which will be above the melting point of the chocolate as a whole. At 95 deg. F., there is a small amount of latent heat evolved due to the setting of the very high melting-point fractions of cocoa butter. At 100 deg. F., practically no latent heat is released.

The No. 27 wire has been chosen because it represents the finest wire which can be used for the complete range of chocolate viscosities including "icecoats," but excluding chocolate paste. The heavier the wire used, the less sensitive is the reading. For example, if the chocolate is standardized on a No. 22 wire and the reading is 40, then the reading would be 400 on a No. 27 wire under the same conditions. Using a No. 22 wire, a check of 1 to 3 points would be considered to be the proper rotation for the MacMichael except where certain substances are tested. At 35 r.p.m., there is likely to be developed some eddy currents which may interfere with the viscosity reading.

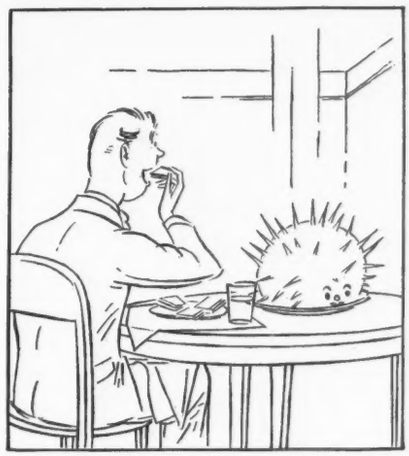
The whole argument comes down to this: While good checks may be obtained with a No. 24 wire, 3-cm. immersion, 95 deg. F. and 35 r.p.m., these checks do not represent the closeness to which the viscosity may be checked, using a finer method of measurement.

I do not want to criticize the method described by Dr. Freundlich very severely because undoubtedly he obtains very good results, but I do believe that, whatever method is used, it should be a standard method which all laboratories would agree to adopt. I do not know the exact relationship between the readings obtained by Dr. Freundlich's method as compared to our method, but I am interested enough in this subject to obtain a No. 24 wire and run a series of comparative tests. When this has been done I will be pleased to discuss the results.—BENJAMIN J. ZENLEA, *Walter Baker Co.*

Defending the "Sniffer"

Boston, Mass.—One would assume through reading your comments on "Why Smell Coffee?" that the laymen referred to are saps because they use their sense of smell when partaking of their favorite brew. Probably I react differently to most readers; however, I got the impression that you were somewhat ridiculing the value of Mr. Layman's sense of smell.

I am convinced that when food manufacturers begin to realize that the sense of smell is more important than the sense of taste to food acceptance, and when unfavorable odors are eliminated or replaced with stimulating odors, the manufacturer will be benefited through increased sales. To cite an instance of the smell influence, some poultry packers have not realized that one of the greatest objections to their product is the odor. Under the method of feeding poultry, the intestines are filled with high-moisture food. During digestion and elimination, the odor that is produced is not pleasant. Then this poultry is killed, plucked, chilled, and prepared for marketing. When the blood is drawn from the circulatory system, and the birds begin to cool from the outside inward, even though the bird has been fasted previous to killing, these odor-carrying intestinal juices recirculate to a certain extent back into the flesh, particularly that flesh near the intestinal cavity.



***This is a picture of a hungry man enjoying a snack of pulverized sea urchin. It came to the Editor's desk with a letter from Clark Samuel, of the news bureau of Armstrong Cork Co., Lancaster, Pa. Mr. Samuel says it was used to illustrate a philosophical rumination by M. S. Ireys, editor of Modern Closures, "who just couldn't get out of his head the idea of eating pulverized sea urchin as described in* FOOD INDUSTRIES.**"**

No wonder, then, that many people object to the dark meat, or the meat nearest the entrail cavity. The same bird, drawn as quickly as possible after killing, while the carcass is still warm would eliminate contaminating the flesh with unpleasant odors. And I, for one, am particularly pleased with the material appearing in your recent issues describing the methods of quick-freezing drawn poultry. I feel confident that the public will be quick to detect the improvements of these birds through the elimination of the intestinal odor contamination. I also feel sure that the packers of these birds could certainly dramatize the elimination of intestinal contamination and make it a feature.

To get back to the layman's sense of smell, he may not know why he objects to the dark meat, or why he inhales the fragrance of his coffee; but what does that matter as long as his sense of smell tells him whether or not he enjoys eating or drinking that particular product? If the layman can, through his sense of taste, distinguish only combinations of sweet, salt, bitter and sour, then surely his sense of smell tells him about most of the distinguishing points. Therefore, I would never ridicule nor minimize the importance to the manufacturer of the habitual "sniffer."—W. E. BROEG, *Parker-Broeg Studio of Baking and Cooking, Boston, Mass.*

NOTE: *The editorial commented on, however, refers to "professional" smelling in contrast to "consumer" smelling.*
—Editor.

New DISCOVERIES AND INVENTIONS

PACKAGING

Materials for Food Cans

ALTHOUGH TIN PLATE still reigns in the realm of food can materials, it has potential rivals in glass, aluminum, black plate, electrolytically tinned plate, and synthetic plastics. The required properties are light weight, strength, elasticity, corrosion resistance, ease of hermetic sealing, attractive appearance, ability to withstand sterilization, rapid cooling, low breakage hazard, ease of storage and shipping, and low cost. In the field of commercial canning, glass has not been able to surmount the economic barriers to general use, though it serves well in special uses. Synthetic plastics have still to prove their ability to compete. Aluminum is still awaiting solution of certain problems in can manufacture and in keeping qualities of the canned foods before it can overcome the economic aspects of the competitive situation. Black plate, however well lacquered it may be, is not entirely safe from corrosion and hydrogen swells, nor from absorption of iron by the canned foods. Electrolytically tinned plate shows considerable promise, but still has some serious technical difficulties to overcome. Any new material, to be favored over tin plate, must successfully meet severe tests and requirements proving it to be thoroughly acceptable.

Digest from "Materials for Food Cans," by E. Nehring, *Angewandte Chemie*, 50, 632, 1937. (Published in Germany.)

BAKING

New Acid Ingredient for Baking Powder

AN ACIDIC PRODUCT which is useful as an ingredient in self-rising flour, or as the acid component in baking powder, is prepared by acidifying and drying skim milk. The milk is first condensed, then the acid reagent is added, and the acidified product is dried to a powder by sudden vaporization of the water. Preferably, this is effected by the spray-drying method. Instead of skim milk, buttermilk may be employed to equal advantage.

In the condensation stage, prior to acidification, it is best to continue the evaporation till about 40 per cent of the water originally present has been removed. The acidification should be controlled, and stopped at an acidity represented by 14 to 15 per cent lactic acid, calculated on the total weight of solids in the milk product. As the invention is described in Danish Patent 53,505 (granted Aug. 30, 1937, to Aktieselskatbet Den Danske Mälkekondenseringsfabrik, Nakskov. Denmark) it affords a simple, convenient method for making an inexpensive baking powder from a dairy product.

Heavy Pans for Baking Tests — Unimportant

BAKING PANS made of lighter (1X) or heavier (4XXXX) tin plate than the standard test pan (2XX) all gave about the same results in baking tests. This is true of loaf volume as well as crust color, break and shred, and grain and texture. Those who prefer to use the heavy 4XXXX pans for tests because they are commonly used in the bakery are getting no truer results than if they used the lighter experimental pans.

Digest from "A Comparison of 1X, 2XX, and 4XXXX Tin Pans in Experimental Baking," by Worley and Davis, *Cereal Chemistry*, 14, 769, 1937.

Glutathione in Wheat Germ Injures Baking Quality

MANY EXPLANATIONS of the harmful action of wheat germ on the baking quality of flour have been offered, but they have not been sufficient. Proteases are blamed for modifying the physical properties of dough by promoting protein degradation in the gluten and thereby robbing the gluten of its elasticity and extensibility. But an aqueous extract of wheat germ still has the effect after being boiled, so there must be some other factor than proteolytic degradation caused by enzymes. Various substances which can be isolated from the germ have also been suspected, e.g. raffinose, sucrose, alantoin, choline, betaine, asparagine, arginine and others, but there is not sufficient evidence against them.

In search of the responsible substance numerous farinograms were plotted to show comparisons between samples of dough, one with—and one without—the substance to be tested. The search led to the conclusion (confirming an opinion previously expressed by Holger Jorgenson) that glutathione is wholly or largely responsible for the deleterious effect of wheat germ on flour. Unlike potassium bromate, which tends to counteract the effect, glutathione greatly enhances it. It is significant that potassium bromate is an inhibitor, glutathione an activator of protease.

Digest from "Glutathione in Wheat Germ and its Influence on Flour," by C. M. Albizzati, *Anales de la Sociedad Cientifica Argentine*, 124, 194, 1937. (Published in Argentina.)

METHODS OF PRESERVATION

CO_2 As a Preservative

CARBONATION with CO_2 at 120 lb. per sq.in. was completely successful in suppressing yeast or bacterial action in enzyme clarified, filtered apple juice.

From paper by Vernon Charley, Long Ashton Research Station, read at Harrogate, England, meeting of the *Society of Chemical Industry*.

BEVERAGES

Color of Beer

IF BEER is to be produced in a uniform color, close and exact control must be exercised over all color factors in every stage of malting and brewing. More is at stake than the appearance or eye appeal of the product, because color and flavor are associated with each other in some way. Part of the color is due to melanoids, formed from sugars and amino acids. This source of color must be distinguished from the dyes formed by atmospheric oxidation. Coloring matter formed in malting is small in amount but has a large influence on final color of beer, and this influence is not the same as that of pigments originally present in barley.

Because of the variety of factors involved and their variable influence, the final color of beer cannot be predicted from the color of the malt. Experimental tests do, however, give enough evidence to make it highly probable that a malt with high coloring tendency will yield comparatively dark wort and beer. Temperature during malting is an important factor, the results being differ-

ent for low- and high-temperature malting. The reason for these differences is not yet known.

Digest from "Relations Between the Colors of Malt and Beer," by Kolbach, *Chemiker-Zeitung*, 61, 849, 1937. (Published in Germany.)

COFFEE

Decaffeinized Coffee

THROUGH MORE THAN 35 YEARS of experimentation the preparation of decaffeinized coffee has settled down, for the most part, to the process which comprises swelling the raw bean with water, extracting caffeine with an organic solvent, and expelling the solvent. During the early development of the process these three operations were separate, but modern practice tends toward simplified 2-stage modifications of the original procedure.

One expedient for eliminating the preliminary swelling in water is to swell by heat alone, with exact temperature control so that the natural moisture in the raw coffee beans suffices to swell the beans but is not driven off. Another is to swell and extract in a single operation, using an organic solvent in admixture with the required quantity of water. This is, in essence, the process now used for decaffeinizing coffee, but there are other possibilities.

A fundamentally different method, which has to contend with a number of problems still remaining unsolved, is direct extraction of caffeine with water. The difficulty is that the desirable extractives come out along with the caffeine, and the problem is to restore them to the extracted bean with minimum loss and without sacrificing flavor and aroma. It is not difficult to separate the caffeine from the other extractives, whether by freezing, crystallization, adsorption or other methods. But it is not easy to reunite the extracted bean and its decaffeinized extractives, and on this point depends the successful utilization of water, cheapest of all solvents, for the extraction.

Digest from "Making Decaffeinized Coffee," by W. Roselius, *Chemiker-Zeitung*, 61, 153, 1937. (Published in Germany)

Ozone Treatment for Coffee Beans

CHLOROGENIC ACID, although it has not received the widespread public attention which has been accorded to caffein, is a harmful ingredient in coffee beans and its removal is an important feature in preparing coffee. It has now been found, as set forth in Swedish Patent 88,891 (granted Aug. 3, 1937, to H. Dyckerhoff, Munich, Germany) that chlorogenic acid can be effectively, yet conveniently, removed from coffee with the aid of ozone. The raw beans must first be freed from their wax coating so that the ozone can exert its effect. Superheated steam serves well for stripping wax from the beans, which are then exposed to ozonized air long enough for the chlorogenic acid to be chemically destroyed. To get rid of its decomposition products the ozone-treated coffee is extracted with an anhydrous solvent (which may be acetone). The residual solvent may be removed from the treated beans by vaporization, leaving a coffee preparation which is entirely free from chlorogenic acid. If it is desired to accelerate the ozone reaction, the ozonized air may be heated.

DAIRY PRODUCTS

Power Requirements for Freezing Ice Cream

USING A 40-qt. direct-expansion freezer with 3 and 5-hp. motors, a study was made of how the energy-input and total power required were affected by the temperature at which the brine was shut off, the amount and type of stabilizer, the addition of egg yolk and different dasher speeds.

Reducing the temperature at which the brine was shut off from 25.5 deg. F. to 24 deg. and 22.5 deg. decreased the dasher speed but resulted in greater energy-input and total power used. While 22.5 deg. gave better ice cream, this was impractical owing to prolonged freezing time and increased power consumption (0.69 kw.-hr., compared with 0.46 for 24 deg. and 0.26 for 25.5 deg.). A stabilizer decidedly improved ice cream quality and only very slightly added to the power requirements. Adding 1½ per cent of frozen egg yolk increased the maximum energy input to the motor from 3.37 to 4.55 kw.-hr.

Replacing a 3-hp. motor, which was often overloaded, by a 5-hp. motor did not increase the total power consumed and resulted in slightly faster freezing and equal or better quality ice cream. When the dasher speed was increased from 170 to 200 r.p.m., the time needed to reach 100 per cent overrun decreased slightly, energy input increased, but total power requirements were not affected and the quality was the same.

Digest from "Power Requirements for Freezing Ice Cream," by W. J. Caulfield, C. K. Otis and W. H. Martin, *Journal of Dairy Science*, 20, 645, 1937.

Recovering Cream from Spoiled Cheese

RECOVERY OF CREAM CONTENT from spoiled cream cheese by centrifuging becomes feasible if the cheese is made according to method given in U.S. Patent No. 2,098,764 granted Nov. 9, 1937 to Caspar P. Sharpless, Swarthmore, Pa.

The cheese made by this method is further claimed to avoid loss of butterfat in course of manufacture, to possess superior taste and texture qualities, and to keep well. Its constituents are edible casein, water, butterfat and edible acids in the ratio commonly found or desired in cream cheese.

Casein used may be in the form of cottage cheese, powdered edible casein or wet edible casein. To this casein are added plastic cream (65 to 80 per cent butterfat), the starter in the form of lactic acid or citric and lactic acids mixture or buttermilk, a liquid as water or skim-milk, a curd stabilizer such as agar-agar or locust bean gum, and 0.1 to 0.5 per cent sodium citrate to give finished cheese a smooth texture.

After thorough agitation in a high speed jacketed mixer for ten minutes at 60 deg. F. the mixture is heated to pasturization and homogenized sufficiently to give a smooth texture without excessive dispersion of fat particles.

As provided for in U.S. Patent No. 2,098,765 neutralized sour cream may be used instead of plastic cream with the same results.

Both patents are assigned to Milk Processes, Inc., Philadelphia, Pa.

Oxidized Flavor in Milk

WHEN a moderately pronounced oxidized flavor develops in pasteurized milk owing to traces of a soluble copper compound being added, some ingredient other than the fat is responsible. This follows from determinations of the iodine value of the fat, the experiments being repeated after a year's interval. The authors feel that lecithin and cephalin, which are found on the surfaces of the fat globules in milk, may be the culprits. The iodine value method is not sufficiently exact to be used to prove this.

Digest from "Oxidized Flavor in Milk: The Effect of Metal-developed Oxidized Flavor on the Iodine Number of the Milk Fat," by Brown, Dustman and Thurston, *Journal of Dairy Science*, 220, 599, 1937.

FATS & OILS

Preventing Losses in Oil Refining

IN NEUTRALIZING crude animal or vegetable oils with alkali to remove free fatty acids (and with them the coloring matter and slimes), there are sources of loss other than weight of free acids removed. Neutralization conditions must be adapted to minimize these extraneous losses, a necessity which has led to the use of one pro-

(*Turn to page* 52)

General Instructions for Carbonated Beverage Plants Submerged in Flood

These instructions developed out of the 1937 flood in the Ohio Valley. The practices set forth are useful to food plants making other products than carbonated beverages.

THE possibilities of transmitting water-borne diseases such as typhoid through food products, including carbonated beverages, is very great in flood areas; particularly so where finished goods or any of the raw materials have been wetted or submerged by the flood waters.

Therefore, in the interest of public health, it is imperative that exact steps be taken to assure the safety of bottled carbonated beverages. The following statements give methods whereby certain items can be salvaged. Where recommendations are made, *follow them exactly;* where it is stated that materials should be destroyed, *do so,* and under no circumstances attempt to salvage them.

The best means of sterilizing is the use of chlorine solutions; by heat applied by boiling; or by steam pressure.

Filled bottles of carbonated beverages which have been submerged:

1. Flush bottles thoroughly with hose to remove all visible dirt.

2. Wash thoroughly the outside of bottle, using lukewarm solution with good cleaner or cleanser as directed on package. Use stiff bristle brush and scrub all parts of bottle, paying special attention to crimps around crown. Rinse in clear water.

3. Same treatment for case.

4. Place bottles and cases in chlorine solution which contains not less than 100 parts per million of available chlorine (to make 25 gal. of this solution about ½ lb. of chlorine compound is necessary). The bottles *should be inverted* in the chlorine solution to eliminate air under the crown which might interfere with sterilization of the crimps. Leave in solution for *at least* ten minutes. Remove, but *do not* rinse off the chlorine solutions; allow them to air dry. (See page 41.)

Unfilled bottles:

The conditions recommended for washing carbonated beverage bottles in machine soakers (*in no case* resort to hand-washing!) will assure sterility of the bottles from disease-producing organisms. The conditions are:

1. Soaker solutions of at least 3 per cent alkali strength.

2. Caustic content of at least 1.8 per cent.

3. Maintained at a temperature of not less than 130 deg. F.

4. Bottle immersion in the solution not less than five minutes.

The above recommendations are safe. In the following, covering raw materials, it will be necessary to have the judgment of some competent person, preferably a health official. These recommendations are correct if properly applied.

If there is any doubt, put the suspected material to one side and do not use it until an authority has passed on it.

In cases where we recommend discarding do not use the material under any circumstance.

Water:

If you do not have connections to a city supply which has been approved, you are not safe. If you have a well of your own whcih has been submerged or at all near a flooded area, there is grave danger that it is carrying disease organisms. No well should be used for water for beverages or for water for refugees unless it has been approved by the local health authorities since the flood. Doubtful water is safe only after boiling!

The water which you employ for beverages and also for cleaning up your equipment must be free from disease.

All water lines, filters, (also water filter papers, cloths, etc.) hoses and machinery using water (carbonator, filler, etc.) should be thoroughly sterilized by flushing with a 200 part per million chlorine solution which is allowed a contact time of at least 20 to 30 minutes. To rinse out the chlorine solution only water which is known to be safe should be used. Likewise, after such sterilization is complete, only water known to be safe should be run through the machinery. (Take machine down, if necessary, to get solution to all parts.)

Sugar:

Sacks of sugar which have become fouled, dirty, or lumped together should be discarded. Sugar which has been merely wetted and is otherwise not in bad shape can be used only by making into syrups of at least 32 deg. Baume and boiling vigorously for at least ten minutes. If this same syrup has at least one fluid ounce of citric acid solution added per gallon it need only be boiled for about one or two minutes. *Under no circumstance make any syrup by merely mixing such sugar with cold water; it must be boiled!*

Crowns:

Crowns which have been submerged and which have become badly fouled and dirty should be discarded. Those which are in their original unopened packages and which have been wetted can be recovered by placing in metal containers or boxes, placed in the ster-

ilizers commonly found in bottling plants (used for sterilizing chocolate milk drinks, etc.), and given a steaming at 15 lb. pressure for ten to fifteen minutes, or 10 lb. pressure for 20 to 30 minutes. Make certain that sufficient steam pressure is employed. After such sterilization the crowns should be placed in thoroughly clean sterile containers and dried.

An alternative of this method, which is not highly recommended since it is likely to cause discoloration, damage to the lithographing, and probably rusting of the crown, is immersion of the crowns in a solution of at least 100 parts per million chlorine solution for at least ten to twenty minutes, after which the crowns should merely be shaken out in a wire basket (*not* washed off with water) and allowed to dry.

Flavor Concentrates:

Partially used or previously opened bottles of concentrate should be discarded, for the danger of leakage into the contents is too great to risk. Unopened, unused bottles and jugs should receive the same treatment as recommended for filled bottles.

Color and acid solutions:

Color and acid solutions which have been exposed to the water should be discarded. Dried powdered colors which have been merely dampened can be used only when solution made from them is boiled for at least ten minutes before using.

Citric acid crystals which have been only wetted (discard dirty or fouled) can also be used, if the solutions made from them are also boiled for at least ten minutes before using. Care must be taken in both cases to see that every bit of these raw materials is boiled when made into solution; there must be no slip-up. *We repeat again, color and acid which have been fouled or have become dirty should be discarded.*

Cloths, syrup room equipment, filters:

All cloths which are used around the syrup room or for filtering syrup must be either boiled or soaked in strong chlorine solution to prevent carrying organisms or diseases. All vessels, syrup lines, filters, pumps and measures used for syrup making should be thoroughly washed down until clean, then flushed with a chlorine solution of at least 200 parts per million, allowed contact for at least 20 to 30 minutes, then rinsed with safe potable water.

General instructions for cleaning plants:

The following steps should be applied to bottling room and the syrup room particularly, as well as to the plant in general.

1. Flush walls, ceiling, equipment, and floors with hose, using as high pressure as possible.

2. Scrub all surfaces of walls, ceiling, equipment and floors with good cleaning agent, using lukewarm water. Flush all surfaces with clear water. This must be thoroughly done.

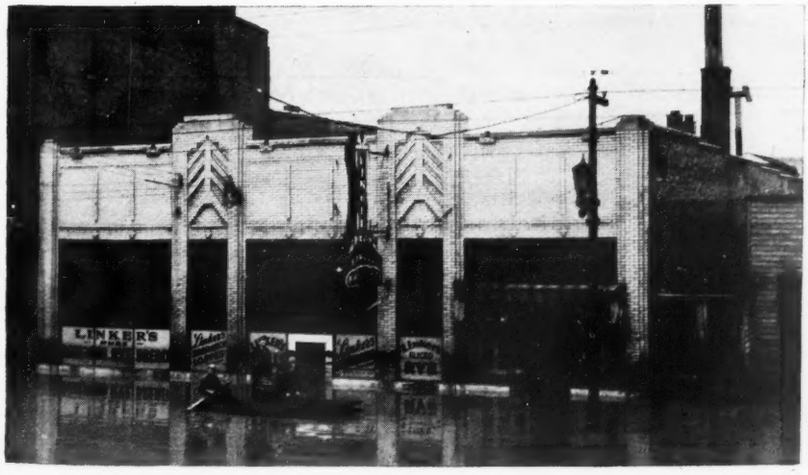
3. Spray with chlorine solution, using 2 oz. to 4 oz. of chlorine compound to each gallon of water.

Chlorine solutions:

Chlorine solutions are made from chemical compounds, usually powders, which release chlorine in an active state when put into water. This chlorine sterilizes by destroying organic matter, including bacteria. Best known to bottlers are Diversol and Sterichlor compounds. Also obtainable are commercial compounds known as B.K. solution, HTH. compound, etc., or chlorinated lime. The first four compounds are used in about ½ lb. to each 25 gal. of water for a 100 part per million (double for 200 p.p.m.) chlorine solution (for exact amounts read on the individual container). The commercial chlorinated lime is very unsatisfactory since it loses its strength very rapidly on standing, and must therefore be used in amounts of two to three times the above (1 to 1½ lb. per 25 gal.). In all events obtain the *freshest* compound available, and do not use any that has been wet or in open cans since such conditions destroy the strength in a short time.

Chlorine solutions are effective only for a short time and should be changed at least every two or three hours to insure sterilizing action. All articles so sterilized must be cleaned first since dirt nullifies the action of chlorine. This is important.

The use of steam for sterilizing is very unsatisfactory unless the steam is allowed to run through the apparatus until steam pours out the furthermost end, and all parts are up to at least 190 deg. F., for unless the parts get near to the boiling point there will be no effect.—*Instructions issued by American Bottlers of Carbonated Beverages, 224 Southern Building, Washington, D. C.*



Food Equipment News

REVIEW OF FOOD PROCESSING EQUIPMENT, ACCESSORIES, AND SUPPLIES

Portable Refrigerator

"MIRRACEL" portable refrigerator is an insulated box suitable for loading into freight cars or trucks and designed for the transportation of less than carlot shipments of perishable foods.

This box is constructed with a door at one end. Within is the compartment for holding the commodity; the "Icer," a compartment capable of holding 200 lb. of solid carbon dioxide; and an induction plate 50 in. long and 15 in. wide.

Cubic capacity of the "Mirracel" is 160 cu.ft. of loading space. Total weight when empty is 900 lb. Load limit is 6,000 lb. Dimensions (outside) are 7x5 ft., and 6 ft. high. Including the under-carriage, overall height is 6 ft. 9½ in. Seven of these units fit into a boxcar.

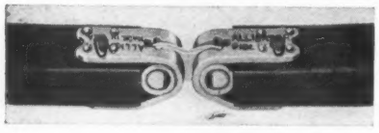
The construction of the box is of ⅜ in. fir plywood outside, ¼ in. fir plywood inside, with four air cells between, formed by three sheets of "Silvercote" fabric. Total wall thickness is 2¾ in.

The under-carriage is a heavy angle iron frame of welded construction. Two 8 in. diameter truck wheels are used at rear of box. At the front are two angle iron legs. There is also a lock-pin at the front, in the center, to accommodate the "Clark Lift Jack", which is used to lift the refrigerator off its front legs when it is to be moved. This lift jack is also equipped with two 8 in. diameter wheels.

The lift-jack and under-carriage equipment of the "Mirracel" portable refrigerator units are manufactured by All Steel Welded Truck Corporation, Rockford, Ill., who are also distributors for the device. The refrigerator boxes are manufactured by Goodwillie-Green Box Co., Rockford, Ill.

V-belt Fastener

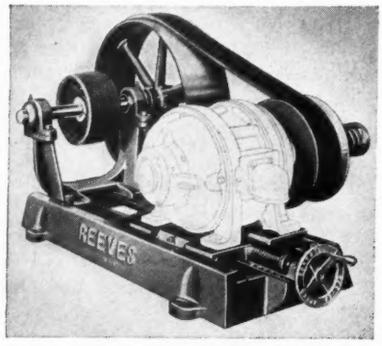
FLEXIBLE STEEL LACING Co., Chicago, Ill., has developed the "Alligator" fastening for joining C-section V-belts of fabric-core, cross-weave construction. The feature of this fastener, as shown in the illustration, is the double rocker pin supported in bronze bushings. Another feature is the method of holding the end plate to the belt end without materially weakening the belt or bulging its sides. Installation is on the job. No metal can touch the pulleys.



Fastener for V-belts.

"Vari-Speed" Motor Pulley

REEVES PULLEY Co., Columbus, Ind., has developed a new design of the "Vari-Speed" motor pulley, a counter-shaft type, as shown in the accompanying photograph. This is for use where unusual speed change is desired. It embodies a counter-shaft mounted on a common base plate with the motor.



"Vari-Speed" pulley drive of counter-shaft type.

While a straight-faced pulley is illustrated, power take-off may be from sprocket, pinion or other driving means.

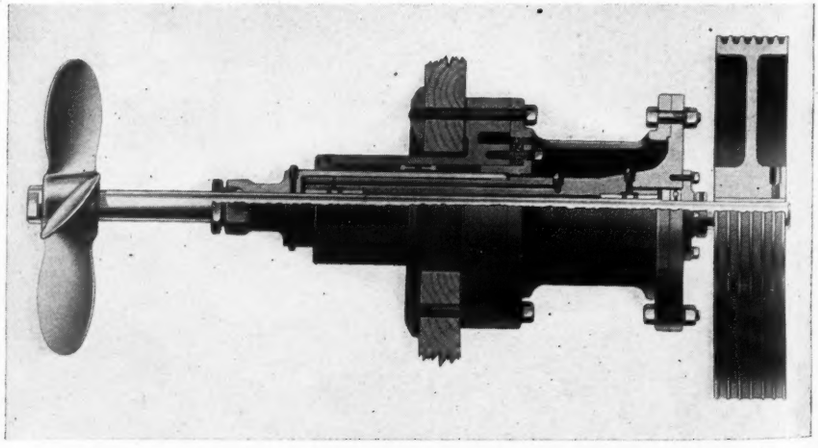
This drive is built in seven sizes, ranging up to 7½ hp. and covering speed ratios of 3 to 1.

Mixer Bearing

MIXING EQUIPMENT Co., Rochester, N. Y., has brought out a side-entering propeller-type mixer, with a new stuffing box and bearing design said to eliminate troubles previously encountered.

The accompanying photograph shows this new design. In it, the stuffing box itself has no contact with the shaft proper. A "folded back" member (a hollow cylinder open at one end), securely attached to and revolving with the shaft, takes all wear at this point, positively prevents contamination of the mix by stuffing box lubricants, and prevents any contact whatsoever between the tank contents and the bearings.

Among advantages claimed for the design are: 1, bearings are placed well forward to prevent shaft whip; 2, bearings are mechanically separated from the stuffing box; 3, no liquid from the tank can come into contact with the bearings; 4, stuffing box is lubricated and can be reached from outside the tank; 5, all stuffing box wear occurs on removable sleeve in-



Cutaway view showing "folded back' stuffing box construction.

stead of on shaft; 6, the "folded back" stuffiing box design, whereby the packing and bearings occupy the same linear dimensions, permits complete servicing of the unit from outside of tank.

This unit is made in all machineable alloys in sizes up to 20 hp. and is furnished for V-belt drive only. While it could be used in any application, it is intended only for those difficult and hazardous locations in which its additional cost is justified.

Moist-air Cabinet

DESPATCH OVEN CO., 622 Ninth St., S. E., Minneapolis, Minn., is making a moist-air cabinet with a cooling system to operate in laboratories where the room temperature exceeds that of the moist-air cabinet. These cabinets also have a humidifying system with an automatic humidity-control instrument, a heating system with automatic temperature control, and a Bristol combination temperature and humidity-control system and recorder.

The entire unit is constructed of stainless steel.

Air Eliminator

FOR AUTOMATICALLY VENTING DRYERS, steam coils and other heating apparatus using steam up to 150 lb. per sq.in. pressure, Gorton Heating Corp., Cranford, N. J., has developed the "Gorton High Pressure Air Eliminator."

In this device, the operating member is made of a corrosion-resistant metal that is sensitive to heat changes. When the temperature reaches 212 deg. F., this member closes the valve and keeps it closed until the temperature drops below that point. As soon as the temperature falls below 212 deg. F., the operating member automatically opens the valve. Operation is positive. The device is made of bronze, nickel-plated, and is $2\frac{1}{2}$ in. in diameter and $4\frac{5}{8}$ in. high, overall. The bottom pipe connection is $\frac{1}{2}$ in. in diameter; air outlet, $\frac{3}{16}$ in. in diameter.

Device for eliminating air from steam heating coils and dryers.

Peanut Butter Mill

JABEZ BURNS & SONS, INC., 11th Ave. and 43d St., New York, N. Y., has brought out a new grinding mill for producing peanut butter. This mill is designed to turn out a uniform product with economy. The feed control for the peanut stock has been positively synchronized with the salt feeder, so as to maintain the same proportion of salt in each unit of finished product. Also, the flow of salt is adjustable to give any desired flavor.

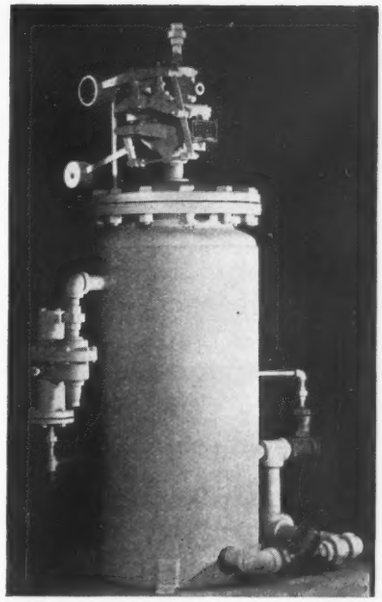
This mill embodies a uniform, controlled feed. This is said to prevent crowding of the grinding disks, which would tend to overheat the butter and liberate an excessive amount of oil. The gentle pressure feed to the grinding plates is a patented feature of the mill, claimed to assure uniform cutting action on every peanut kernel. It also prevents underfeeding and overfeeding.

The Burns peanut butter mill comes in three capacities, 600, 1,000 and 1,400 lb. per hour. It is designed for V-belt drive from an 1,800 r.p.m. motor mounted inside the stand. Capacity depends upon motor size, which is 5 hp., $7\frac{1}{2}$ hp., and 10 hp. respectively. Various grinding plates are furnished as desired, including plates for making "crunch" butter, and specially fine plates for making a creamy butter. Also, a universal discharge is provided to discharge the product at any angle convenient for the filling machines.

Valve Improvements

JENKINS BROS., 80 White St., New York, N. Y., recently announced improvements in its line of standard bronze valves. These include a new handwheel design that affords large gripping area without bulkiness and has a deeply depressed center to prevent the hand from touching a hot wheel nut. A new valve index plate is held in this depressed center by the wheel nut and gives information for ordering replacements. A new renewable composition disk is also offered, said to have long life in steam service, surpassing that of other compositions.

Jenkins has also announced the Fig. 976, plug-seat valve, with plug and seat-ring made of a stainless steel having a Brinnell hardness in excess of 500. This valve is for severe service such as continuous throttling for pressure reduction, or free blow duty as with injectors or heating coils.



"Liquivator" device for transporting liquids.

Liquid Transporter

MOREHEAD MANUFACTURING CO.., Detroit, Mich., has developed the "Direct Pressure Liquivator," a device for automatically transporting liquids by means of the displacement principle. It consists of a stationary pressure tank to which an operating valve mechanism is externally connected. Counterweight displacement tanks within the pressure tank provide the power for valve control through levers.

Since the valve mechanism is separate from the tank, it may be assembled with any size of tank for handling any given volume of liquid. There is a remote control feature, which permits a variety of applications to special handling problems.

These "Liquivators" are available in both metering and non-metering types. Metering units are accurate within plus or minus 2 per cent. Either type can be furnished in a self-contained or a remote control assembly, to suit requirements..

Conveyor Roller

A NEW HEAVY-DUTY ROLLER has been added to its standard line by Mathews Conveyor Co., Ellwood City, Pa.

This roller is of $3\frac{1}{2}$-in.-outside-diameter seamless steel tubing, with $\frac{5}{16}$-in. walls. The bearing, Type 47-SB, is of new design, having steel inner and outer labyrinth seals, hardened inner and outer ball races and thirteen $\frac{5}{16}$-in.-diameter hardened-steel balls, assembled within a pressed-steel jacket. The assembled roller has an average rated capacity of 2,200 lb. The axle is of hexagon type, drilled and fitted for lubrication.

This roller is furnished from 6 to 48 in. in length and can be spaced in frames on centers from 4 in. up.

THE FOOD INDUSTRY *News*

JANUARY • 1938

General News—Business Trends—Men, Jobs and Companies

FDA Promises To Fight for Adequate Food Law

"The fight will be continued until a measure fully adequate to consumer protection has been enacted." This is the policy plan officially published by the Food and Drug Administration in the annual report of the chief on the last fiscal year's business. This conclusion in effect answers on behalf of FDA the four questions which are indicated in the same report as "the principal issues involved in the situation" of legislation now before Congress giving new authority for food, drug and cosmetic regulations. In paraphrase these answers appear to be:

1. Multiple seizures should be used to prevent distribution of misbranded products without waiting for court trial.

2. Seizure-case trials should be in the courts and before the juries of consuming areas, not before courts and juries of producing areas.

3. Misbranding should include any labeling that is "false or misleading in any particular," not merely that "misleading in a material respect."

4. Advertising control should be under the Food and Drug Administration, not by Federal Trade Commission procedure.

These important points affecting pending legislation make clear the stand of the Department of Agriculture before Congress.

Butter Manufacturers Talk Quality Control

Growing interest in matters of quality control is evidenced by the more than 30-per cent increase in registration at the annual meeting of American Butter Institute, held in Chicago Nov. 30—Dec. 1. The 400 attendance topped last year's registration by 100 and set a new high record.

A symposium on the keeping quality of butter was the feature of the meeting. This symposium gave evidence of the progress made in the cream improvement program started by the American Association of Creamery Butter Manufacturers four years ago.

Discussed as significant factors in the keeping quality of butter were: (1) Plant and equipment sanitation; (2) churning acidity and its control; (3) pasteurization of cream for buttermaking; (4) cooling, churning and workmanship; (5) the body of the butter; and (6) starter distillate.

Chemical studies, microbiological examination and practical tests were subjects of papers on methods for evaluating the keeping quality of butter and for giving the buttermaker an insight into the condition in which his butter would reach the retail outlet.

Labor and tax legislation, national advertising for butter, food habits, sales trends and committee reports on cream quality, research and pending changes in freight rates were other subjects covered in the two-day and banquet-evening sessions.

Officers elected for the coming year are: President, Clarence Nielsen, Wapsie Valley Creamery, Independence, Iowa; vice-president, H. J. Credicott, Freeport Dairy Products Co., Freeport, Ill.; treasurer, H. J. Bird, Swift & Co., Chicago, reelected.

CONVENTIONS

JANUARY

17–19—New England Association of Ice Cream Manufacturers, Copley Plaza Hotel, Boston.
23–27—National Canners' Association, Hotel Stevens, Chicago.
23–27—National Food Brokers' Association, Palmer House, Chicago.
23—National Preservers' Association, Chicago.
24–28—Fifth International Heating and Ventilating Exposition, Grand Central Palace, New York.
25–27—American Society of Refrigerating Engineers, Hotel Roosevelt, New York.

FEBRUARY

7–19—Annual Canners' and Fieldmen's School, Oregon State College, Corvallis.
21–24—Associated Bakers of America, convention and exhibit, Hotel Sherman, Chicago.

Genealogy

In order to make it a matter of annual record, this statement is published every January:

FOOD INDUSTRIES was founded in 1928 by McGraw-Hill Publishing Co. Dr. H. C. Parmelee was its first editor. Dr. L. V. Burton succeeded him and is its present editor. Associated with him are: E. S. Stateler, associate editor (now located in the Chicago office); G. L. Montgomery, managing editor; F. K. Lawler, assistant editor; Ivan C. Miller, distribution editor; and R. S. McBride. editorial representative in Washington.

Wrappers To Be Tested for Water Permeability

Test of wrapping materials for permeability of water vapor is being undertaken as a special study by a subcommittee of the Technical Association of Paper and Pulp Industries (TAPPI for short).

This subcommittee proposes to send out to a considerable number of paper and other wrapping material laboratories uniform samples of material which will be tested in each laboratory to determine the degree with which water vapor penetrates through the sample. It is hoped by this means that some degree of standardization of test methods can be achieved, and that results of wrapping-material tests can be made more useful to the users of the goods.

The committee project is being carried out under the direction of Chairman G. J. Brabender, Marathon Paper Mills Co., Rothschild, Wis.

20 Awards Will Be Given for Merit in Packaging

Twenty awards for distinctive merit in packaging will be made by American Management Association at the Packaging Exposition and Conference to be held in Chicago, March 22–25. These awards will be in addition to the Irwin D. Wolf Trophy to be presented for the best package in all classifications.

The distinctive merit awards will be based upon a recognition of factors contributing to merchandising effectiveness, economy, efficiency and good

design. One award will be made in each of these classifications: (1) single color, (2) more than one color, (3) typography and/or lettering, (4) shelf visibility, (5) redesign, (6) merchandising ingenuity, (7) consumer convenience, (8) combination packaging, (9) secondary use, (10) layout and/or decorative design, (11) insert, (12) inventiveness in package construction, (13) two or more materials in one package, (14) family of packages, (15) design to promote product as gift, (16) package for product not previously packaged, (17) effective shipping container from standpoint of good design in printing and color, (18) effective shipping container from standpoint of merchandising and construction ingenuity, (19) counter display pieces, (20) floor display pieces.

Machine That Peels Shrimp

Mechanical shrimp peeling has been developed in a plant at Petersburg, Alaska, according to Charles E. Jackson, deputy commissioner of the Bureau of Fisheries. The device is said to operate satisfactorily in the plant of its inventor, Earl Ohmer, who plans to retain it for his own use. The shrimp is fed by a conveyor belt head first into the machine, and the mechanism rips it from end to end, turns it over, lifts off the shell, slices off the head and tail and drops the meat into a container.

Crop Control Measures Acted Upon in Congress

Before recessing for the holidays, Congress succeeded in moving farm legislation well along the road to enactment. The House passed the Jones bill on December 10, imposing Federal control over the marketing of five basic agricultural commodities—wheat, corn, rice, cotton and tobacco.

As passed by the House, the farm bill was much the same as the form reported from committee, except that there was attached to it the Boileau amendment prohibiting farmers from converting land taken out of major-crop production into pasture land, an amendment fostered by dairymen. The House at first ruled out the provision for compulsory marketing quotas for wheat, only to reverse itself later and put that provision back.

Canners are worried somewhat about the provisions of this measure as it left the House, because of a "live-at-home" feature which will affect sales of canned goods to farmers. Before a farmer can qualify for benefit payments under the terms of the bill, he must establish that he has grown as much of his own food requirements as reasonably possible.

The farm legislation in the Senate took the form of the Pope-McGill bill, which differs materially from the Jones bill passed by the House. This bill is opposed by Secretary Wallace, who believes that its provisions place the ever-normal-granary reserve levels so low that it would force the operation of compulsory marketing quotas more frequently than otherwise would be necessary. An attempt to substitute the Jones bill passed by the House for the Pope-McGill bill of the Senate is expected, because of the extreme provisions of the latter. But the success of such a move is doubtful.

In addition to favoring lower marketing quotas, the Senate measure differs from that passed by the House in several respects. The former provides for a loan corporation under the Department of Agriculture; the latter places it under the Commodities Credit Corp. Then the Senate's ever-normal-granary levels are lower than the House wishes. Still another question which will make for delay in conference is raised by the matter of contracts. The House bill does not provide for contracts, while the legislation of the upper house does.

Because of these differences, final action on the farm bill will go over until the regular session of Congress. A large amount of work will have to be done on the two bills to reconcile their many differences.

Food manufacturers have some cause for anxiety as a result of the Senate's authorizing "such sums as are necessary" to finance enforcement of the ever-normal-granary plan. It is not impossible that expenses will reach a magnitude which will call for processing tax levies.

Mid-December

CAPITAL VIEWS

LAW MAKING has progressed very little during the special session, but many trades of votes, obviously never announced, undoubtedly have advanced toward enactment of some of the main items on the agenda. The battle continues to be reform vs. business aid, with the President and his political billions still on the side of reform.

Impending (business men say "threatening") are the wage-hour bill, with little chance of enactment in drastic form; increased farm-control measure, sure to be enacted in annoying cost-raising style; further antitrust regulation, good or bad, according to the viewpoint of the critic; housing aid bill, probably good but not very powerful in a constructive way, and likely to cost the Treasury some money; government reorganization, more concentration of authority in the Executive; tax law revision, intended by Congress to be helpful to business, but intended by the Executive to be as harmless as possible to both Treasury income and reform plans. No one can make much encouragement for business out of the aggregation of clouds so evident on the legislative horizon.

EXTRACT SEIZURES — Flavoring extracts and other food or beverage materials containing diethylene glycol have been ordered seized by Food and Drug Administration inspectors wherever such goods are found. Officials in Washington explain this drastic policy as an effort to protect those who might make unexpectedly large use of minor foodstuffs, like the lumber-camp cook who gets his liquor from the vanilla extract bottle. Drastic and persistent action is promised.

CYANIDE WARNING — The unchanged and drastic attitude of food and drug officials toward even carefully controlled use of hydrocyanic acid or cyanide fumigants is indicated by the following official statement in the annual report recently released: "This Administration's position has been that the use of a highly toxic fumigant on foods is always hazardous because of the possibility of human carelessness and the many unexplored possibilities of retention of the gas by the food under some conditions. The case of illness reported above and the discovery of 2,700 parts per million of hydrocyanic acid in the sample appear to warrant this cautious attitude."

BRITISH TRADE PACT—The full force of Washington is behind the State Department in negotiating a reciprocal trade agreement with Great Britain and in effecting important modifications of the Canadian agreement. Further tariff cuts are expected. But much more important to food manufacturers probably will be the arrangements for joint international action on many commodities of military or commercially strategic importance.

There is even serious talk in Washington about some agreement which might take the form of a treaty providing active alliance between British and American governments and industries for restricting the flow of materials needed in war time to those evidencing aggressor tendencies. Although the executive departments might negotiate such an arrangement, it is doubtful whether Congress, in its present pacifist mood, would approve or permit full effectiveness. Realists in international thinking believe that a plan such as this is the only workable one under which "sanctions" could be established.

CONCENTRATES

• Action on a new food and drug law is expected in Congress "early in January" . . . The Supreme Court has granted a petition that it review the Circuit Court of Appeals decision holding the operations of Santa Cruz Fruit Packing Co. subject to the jurisdiction of National Labor Relations Board. Only 39 per cent of the company's pack enters interstate or foreign commerce. . . . The Federal Anti-Filled Milk Act has been held constitutional by the U.S. Circuit Court of Appeals, sitting in Chicago.

• *Tri-State Packers' Association went on record at its annual convention last month as favoring Federal legislation prescribing standard sizes of metal containers for canned fruits and vegetables, but did not recommend specific sizes. . . . Great Atlantic & Pacific Tea Co. has made denial before the Federal Trade Commission of the charge that it violated the Robinson-Patman Act in accepting brokerage fees. . . . Exclusive bargaining rights for 10,000 Chicago employees of Armour & Co. is sought by Packing House Workers' Organizing committee, a CIO union.*

• A campaign to keep within the State the $41,000,000 now being spent for "imported" farm products is being conducted by Alabama meat packers and grain dealers. . . . The value of plant safety is emphasized by a study made by Armour & Co. which indicates that minor injuries not counted as lost-time accidents cost the company close to $150,000 annually. . . . A new hybrid tomato, the Redcap, believed to be promising for canning because of its earliness and smoothness has been developed by New York State Agricultural Experiment Station, Geneva.

• Food Research *is publishing papers presented at the Food Technology Conference held at Massachusetts Institute of Technology, these to appear in a double issue to come out this month. . . . With Dr. Clyde H. Bailey in charge, University of Minnesota will launch the Minnesota Institute of Cereal Chemistry, Feb. 14–17, with a four-day program.*

General Foods Increases Benefits for Employees

To provide additional benefits for employees, General Foods Corp., New York, has adopted a non-occupational accident and sickness disability benefit plan and a new group life insurance plan. And the company will bear all costs of the sickness and accident benefits, with employees contributing in part to the cost of life insurance.

Under the sickness and accident plan, regular employees are entitled to two weeks of benefits during each year of continuous service, unused yearly benefits accumulating up to a maximum of 26 weeks. One week's benefits in the case of the salaried employee is his regular weekly salary at the time the disability begins. The weekly benefits paid to the hourly rated employee are two-thirds the average earnings for a week.

Under the life insurance plan, participation in which is optional, the employee contributes only 60 cents a month per $1,000 of insurance.

Process for New Industry

A full report of methods of growing, selecting, canning and exporting mandarin oranges has been received from Tokyo by the Bureau of Foreign and Domestic Commerce.

First step is removal of the outer skin, and to aid this the fruit is soaked for a few minutes in water heated to 80 to 90 deg. C., after which it is peeled by hand and the inner skin removed with a bamboo knife. The fruit is then dried and inspected for seeds. Segments containing seeds are discarded.

Two processes have been developed for removal of the membranes and fibers. In the more modern method, the segments are first treated with hydrochloric acid, and heated to approximately 80 deg. C. After this bath, the segments are put in a 3 per cent solution of caustic soda, and boiled for 30 seconds to counteract the effect of the hydrochloric acid. The fruit is then washed in cold water for three or four hours and the segments are graded for size and packed in syrup.

Discovers Dangerous Age

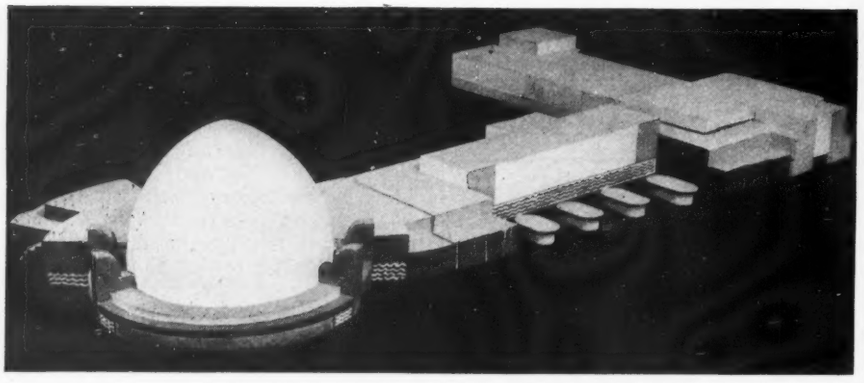
Nearly half (46 per cent) of all accidents requiring treatment of injury involve men between the ages of 20 and 30 years. This has been revealed in a survey of 15,000 accidents by the safety division of Armour & Co., Chicago. A group of men workers from 30 to 40 years old sustained only 28 per cent of the total number of accidents, although the number in this age group is estimated to be about equal that in the 20 to 30 year group.

Seek Fewer Spice Packages

The sizes of spice containers have been reduced to eight in number in a proposed simplified practice recommendation drawn up by the National Bureau of Standards. If accepted by the industry, the reduction in the number of spice packages used is expected not only to reduce the variety that must be stocked by manufacturers and distributors but to result in increased turnover of spice packages, with consequent improvement in quality.

Following is a table of the recommended sizes for tin and fiber containers:

Size (net weight)	Maximum capacity
1 ounce	80 cubic centimeters
1¼ ounces	100 cubic centimeters
1½ ounces	120 cubic centimeters
2 ounces	145 cubic centimeters
3 ounces	200 cubic centimeters
4 ounces	250 cubic centimeters
8 ounces	500 cubic centimeters
16 ounces	950 cubic centimeters

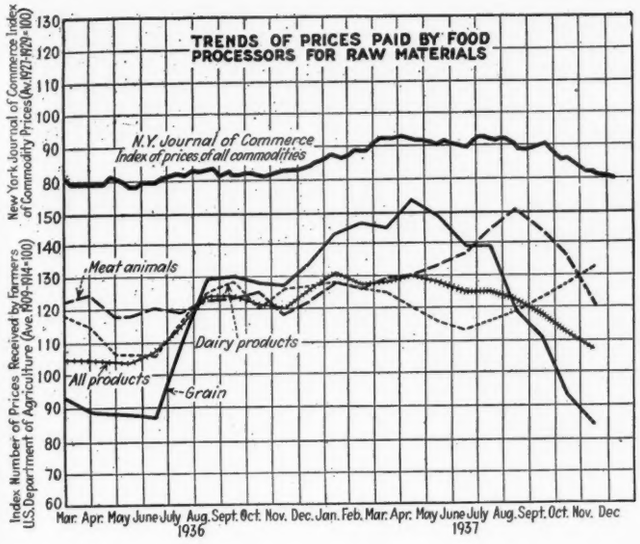


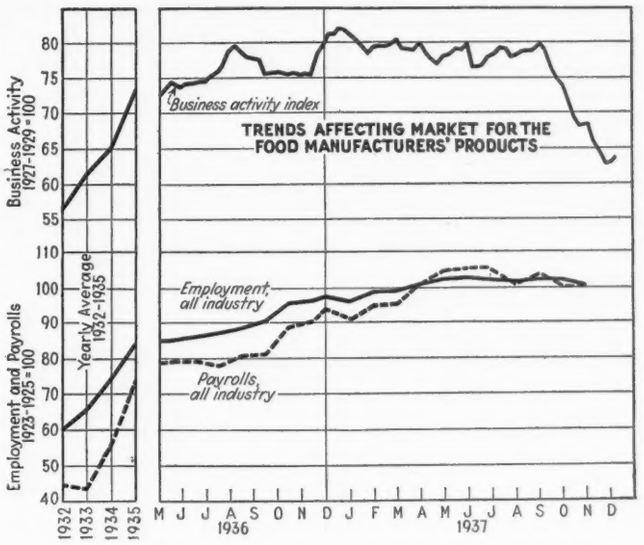
FISHERIES BUILDING OF WORLD'S FAIR

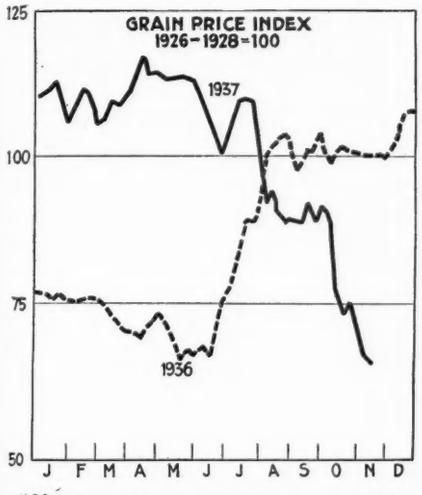
This architect's model illustrates the design of the $250,000 aquarium in which will be exhibited fish from the seven seas and the rivers and lakes of the world. Food fish and commercial fishery products will be displayed, along with game fish and methods of fishing.

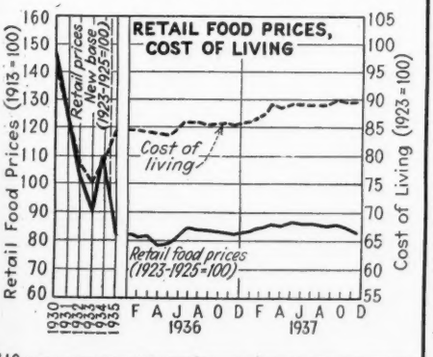
HONORED BY AGMA

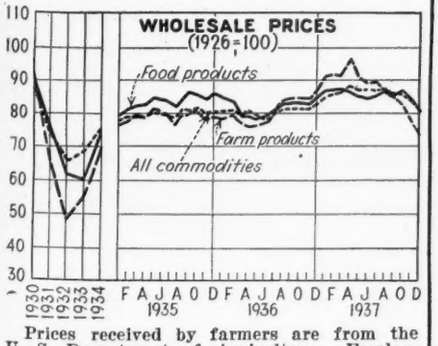
Professor Henry C. Sherman, University of Columbia scientist and international authority on vitamins, received the third annual award of Associated Grocery Manufacturers of America. This honor was in recognition of Professor Sherman's "outstanding contributions to the science of nutrition and his leadership in education of the public concerning the correct use of food."


TRENDS OF PRICES PAID BY FOOD PROCESSORS FOR RAW MATERIALS
N.Y. Journal of Commerce Index of prices of all commodities
Meat animals
Dairy products
All products
Grain
Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec
1936
1937









Prices received by farmers are from the U. S. Department of Agriculture. Employment, payrolls wholesale prices and retail prices from the U. S. Department of Labor. The business activity index is that of *Business Week*. The cost of living index is from the National Industrial Conference Board. The data on grain prices is from the National Fertilizer Association.

BUSINESS TRENDS

Commodity Prices Steady

At mid-December, commodity prices apparently steadied, after an almost continuous downhill tumble lasting since late in September.

While the various indexes were not in entire accord on this point, the general trend indicated that the downward movement had at least halted. The United States Department of Labor index was steady at 82.0 for the first two weeks in December, the New York *Journal of Commerce's* index fell from 80.5 to 80.0 in the same period, and Professor Irving Fisher's index fell from 84.6 to 84.3. Compared to the larger movements registered in earlier weeks, these figures showed little change.

Grain prices seem to have passed their low point and turned definitely upword, having increased 3.35 per cent in the first two weeks of December. Prices for general farm products also increased. Coffee, cocoa and sugar continued downward, as did meat; while eggs, cheese and butter advanced.

Fruit Prospects For 1938

During the remainder of the present marketing year (ending in June, 1938) the seasonal rise in prices of fruit is likely to be less than usual, according to the Bureau of Agricultural Economics. This prediction is based on expectations of a somewhat lowered demand in the face of large citrus and apple crops. Specific forecast for some of the most important fruits follow:

ORANGES—The upward trend of orange production experienced through the last ten years is likely to continue, though at a more moderate rate. Of the 34,600,000 bearing trees in the groves of California, Florida, Texas and Arizona in 1937, 45 per cent had not reached full production and 26 per cent were in the relatively young group (five to ten years old). On this basis an average output of 55,000,000 to 60,000,000 boxes for the next five years is expected, compared to an average of 54,044,000 boxes for the last five years.

GRAPEFRUIT—In 1937 output was 30,281,000 boxes, compared to an average of 16,869,000 boxes for the preceding five years. Since only 31 per cent of the bearing trees had reached the age of full production last year, the trend of production is expected to be upward for 1938 and ten years to come.

APPLES—Apple yield in 1937 was unusually large, totaling more than 205,000,000 bu. As this crop was more than 25 per cent over the 1931-35 average yield, it is not likely that the 1938 yield will be as great, particularly as the total number of bearing trees is thought to be decreasing.

PEACHES—Peach production in the United States decreased for the 1933-37 five-years period, averaging about 51,000,000 bu. per year, about 15,000,000 bu. per year below the average for the preceding five-years period. This decrease resulted in better prices and, in consequence, peach tree planting was stimulated and peach orchard care improved. Consequently, a slightly higher average peach yield is looked for over the next five years, although it is not likely that 1938 will surpass the 1937 yield of 59,400,000 bu.

CHERRIES—A considerable number of cherry trees are just coming into bearing. This is expected to increase the average yield somewhat over the next five years, more than offsetting any normal losses or abandonment of orchards.

PEARS—The trend of pear production is upward, chiefly because many young trees in the Pacific Coast States are coming into bearing during the next several years.

GRAPES—The average annual yield of grapes for the 1932-36 five-year period was 2,106,000 tons. Yield in 1937 was 2,627,000 tons. For the next year or so, grape production is expected to exceed the 1932-36 average, but not to equal the 1937 figure.

Farm Outlook For 1938

According to a recent publication of the United States Department of Agriculture, the outlook for American farming in 1938 is that its economic position will be fairly well maintained.

Livestock producers have a somewhat more favorable prospect in 1938 than do growers of the principal cash crops. The feed supply is much more ample than a year ago, and prices of meat animals and dairy products are likely to be fairly well sustained.

In the case of cotton, wheat, rice, and various fruit and truck crops, growers face the alternative that acreage must be held down in line with normal consumption requirements or they may have to sell large crops at low prices.

The major production problem for farming in 1938 is to build up the livestock and crop lines which were cut by the droughts and at the same time avoid a further burdensome surplus of those cash crops which are now in large supply.

Business Down

Although the business decline experienced in recent months continued, its pace was slower than reported in FOOD INDUSTRIES for November or December, 1937. In the four week period ending Nov. 7, the decline was 4.61 per cent, as shown by the *Business Week's* index of business activity, while for the four weeks from Nov. 13 to Dec. 11 the drop recorded by the same index was 3.20 per cent. For the year, the *Business Week* index showed a drop from 83.4 on Dec. 19, 1936, to 63.5 on Dec. 11, 1937, which is a decline of 23.86 per cent.

In December, the bright spot was naturally retail sales, with holiday buying as a stimulant. Prices of stocks, bonds and commodities (Moody's index) also showed improvement at the middle of the month, while electric power production made a healthy increase to a point above mid-December, 1936. In contrast, industrial production and construction showed further declines.

The U.S. Department of Labor index of wholesale prices of all commodities showed a decline of 2.26 per cent for the five weeks ending Dec. 11, 1937, while the decline for the year was 2.15 per cent. This same index showed, for farm products, a decline of 5.53 per cent for the period, and of 16.30 per cent for the year. Wholesale prices of foods, according to the same index, declined 4.27 for the five weeks and 5.17 for the year.

The weighted prices indexes of the New York *Journal of Commerce* show the following changes:

	Change for Month ending Dec. 18	Change for Year ending Dec. 18
General index	— 1.85	— 7.77
Grain index	+ 2.18	— 35.51
Food index	— 4.31	— 13.89

Construction News

	Pending (thousands)	Awarded December (thousands)	Total Awarded 1937 (thousands)
Bakery	$265	$110	$1,892
Beverages	1,715	495	9,516
Canning and Preserving	38	.....	1,624
Confectionery	.....	.....	40
Grain Mill Products	50	.....	835
Ice Manufactured	180	.....	3,566
Meats and Meat Products	175	.....	1,560
Milk Products	160	125	5,658
Miscellaneous	642	355	11,304
	$3,225	$1,085	$35,995

Oleomargarine Output Up

On Dec. 10, the Bureau of Agricultural Economics issued a report showing that domestic production of oleomargarine was about 5,000,000 lb. higher in October, 1937, than in the same month of the preceding year. This contrasts with the figures for the first ten months of the year, which were slightly below the production figures for the same period of 1936. September, 1937, also showed an increase over September, 1936, and it is expected the figures for November and December will tell the same story. The appended table, released by the B.A.E., shows the part taken by domestic and foreign oils and fats in this production of oleomargarine.

Production of Oleomargarine in the United States and Materials Used

(In thousands of pounds)

Item	Sept. 1936	Oct. 1936	Sept. 1937	Oct. 1937
Oleo Oil	1,435	1,741	764	773
Oleostearine	312	294	364	300
Lard, neutral	171	202	112	120
Oleo stock	151	174	94	100
Total animal	2,069	2,411	1,334	1,293
Cottonseed Oil	9,080	10,042	13,282	20,154
Soybean Oil	777	1,559	3,854	2,990
Peanut Oil	391	390	215	255
Corn Oil	17	6	142	75
Total domestic vegetable	10,265	11,997	17,493	23,474
Coconut Oil	13,964	13,619	9,054	6,964
Babassu Oil	1,167	572	157	992
Palm-Kernel Oil	148	625	532	231
Palm Oil	137	29	.....	.....
Ouricuri Oil	36	201	.....	.....
Sesame Oil	3	6	.....	.....
Total foreign oil	15,455	15,052	9,743	8,187
Total fats and oils	27,789	29,460	28,570	32,954
Milk	6,357	6,732	6,411	7,497
Salt and other materials	1,797	1,935	1,662	2,098
Production of oleomargarine	33,711	35,586	34,843	40,645

NOTE: Figures in this table were compiled and computed by the Bureau of Agricultural Economics from reports of the Commissioner of Internal Revenue.

In connection with this increase in margarine production, it is illuminating to note the prices of butter for the same period. The average price of 92 score butter in New York for November, 1937 was 38.1 cents per lb., compared to 33.6 cents per lb. for November, 1936. The price of Danish butter in London for the week ending Nov. 25, 1937 (at current rates of exchange) was 32 cents per lb., compared with 26 cents per lb. for the same week of 1936. Obviously this price situation was not as stimulating to butter importations in 1937, as in 1936. On the other hand, the price of oleomargarine has currently been lower than in 1936. The Chicago price for margarine made from domestic vegetable oils was 15 cents per lb. in November, 1937, compared to 15.5 cents per lb. in November 1936.

INDICATORS

FISH, frozen, in storage on Nov. 15, 1937, totaled 77,712,000 lb., compared to 92,702,000 lb. on the same date of the preceding year.

FROZEN FRUITS in storage in the United States on Dec. 1, 1937, were 128,141,000 lb., compared to 75,254,000 lb. on Dec. 1, 1936, and a 1932-36 average for the date of 73,523,000 lb.

FROZEN VEGETABLES in storage, Dec. 1, 1937, totaled 32,122,000 lb., of which 10,066,000 lb. were peas, 6,300,000 lb. were lima beans, 3,190,000 lb. was spinach, and the remainder made of a variety of other vegetables.

BUTTER, creamery, in storage on Dec. 1, 1937 was reported at 66,208,000 lb., compared to 88,866,000 lb. on the same date in 1936 and a 1932-36 average for the date of 84,444,000 lb.

CHEESE in storage on Dec. 1, 1937, totaled 108,519,000 lb., compared to 114,706,000 lb. on December 1, 1936, and a 1932-36 average for the date of 100,454,000 lb.

EGGS in storage, shell and frozen, on Dec. 1, 1937, were equivalent to 6,128,000 cases, compared to 3,650,000 cases on Dec. 1, 1937, and a 1932-36 average for the date of 4,188,000 cases.

FROZEN POULTRY in storage on Dec. 1, 1937, totaled 108,787,000 lb., against 149,391,000 lb. a year before and a five-year average of 104,677,000 lb.

MEAT in storage (beef, lamb and pork) on Dec. 1, 1937, was reported as 411,553,000 lb., compared to a total of 719,230,000 lb. in storage on Dec. 1, 1936, and a 1932-36 average for the date of 617,054,000 lb.

LARD in storage on Dec. 1, 1937, totaled 33,974,000 lb. The total for Dec. 1, 1936 was 108,765,000 lb., and the 1932-36 average for the date was 79,268,000 lb.

MEN, JOBS and COMPANIES

INDUSTRY

» ARMOUR & Co., Chicago, has announced plans for the construction of a $1,000,000 meat packing plant at Houston, Texas.

» COCA-COLA BOTTLING Co. of Rhode Island, Providence, has started the erection of a new $300,000 plant.

» CRANBERRY CANNERS, INC., South Hanson, Mass., is constructing a cooling, labeling and storage building with more than an acre of floor space and capacity for 250,000 cases of cranberry sauce.

» ENGELMAN GARDENS CITRUS ASSOCIATION has built a $100,000 food packing plant and dehydration unit at Engelman Gardens, near Edinburg, Texas.

» GREGORY-ROBINSON-SPEAS, INC., has begun construction of a new 1,000,000-gal. vinegar plant at Dallas, Texas.

» HOLSUM BAKERY Co., Fort Wayne, Ind., has been reorganized, with $100-000 of capital in preferred stock and $210,000 in common stock. The reorganization included purchase of the stock of Somers Bakery, Inc., St. Petersburg, Fla.

» KRAFT-PHENIX CHEESE CORP. opened a new warehouse at Boston, Mass., early in December.

» LONE STAR CREAMERY Co., Houston, Texas, has let a contract for a $200,-000 plant.

» LOOKOUT OIL & REFINING Co., an Armour subsidiary, is spending $125,-000 for plant improvement at Alton Park Station, near Chattanooga, Tenn. The company manufactures vegetable shortenings, cooking and salad oils.

» PREMIER-PABST CORP., Milwaukee, is building a grain elevator at a cost of $85,000.

» RIO GRANDE VALLEY CITRUS EXCHANGE has completed construction of an $85,000 citrus-juice canning plant and a $76,000 dehydration plant at Weslaco, Texas. Taking the peel of oranges and grapefruit from the juice plant, the dehydration unit will grind this material, remove the moisture from it and convert it to citrus meal, used as livestock and poultry feed.

» SHEFFIELD FARMS Co. has opened its new $2,500,000 fluid milk and milk products plant at Jamaica, N.Y. The building is designed for expansion to meet the demand for milk during the World's Fair.

» STANDARD BRANDS, INC., New York, has contracted for 37,272 sq.ft. of exhibit area in the food zone of New York World's Fair. The company will erect its own exhibit building and will display yeast, coffee, desserts and other foods.

WILLIAM B. DURYEE

He recently resigned as secretary of agriculture of New Jersey and has accepted the position of assistant to the president of Sheffield Farms Co., Inc., New York

ROBERT E. CROWLEY

He has been made secretary of Sheffield Farms Co., New York. He joined the company in 1924 and became controller in 1937.

» STOKELY BROS. Co., Indianapolis, has purchased the Plymouth Packing Co., operator of plants at Eden, Mount Calvary and Plymouth, Wis.; at Lakeland, Minn.; and leasor of a plant at Muscatine, Iowa.

» UTAH-IDAHO SUGAR Co. has closed its $1,000,000 refinery at Bellingham, Wash., because of insufficient beet production and "excessive" labor demands.

» UNION FISH Co., Belvidere, Calif., suffered a loss of $500,000 recently when its cannery, drying plant and storage house were destroyed by fire.

» WASHBURN-CROSBY Co. has obtained a building permit to erect a $130,000 flour-storage structure at Buffalo, N. Y.

PERSONNEL

» J. L. ALBRIGHT, Columbus, has been reelected president of Wisconsin Canners' Association.

» WALTER R. BARRY has become first vice-president of Associated Grocery Manufacturers of America, New York. He is an executive with General Mills Co., Minneapolis.

» SAMUEL BRASS, former president of National Grain Yeast Corp., has organized Brass Yeast Corp. The company is constructing a modern three-story factory and office building at South Newark, N.J.

» WILLIAM G. BREITMEYER was recently appointed general manager of Eckhardt & Becker Brewing Co., Detroit, succeeding Ralph Nadell, who resigned. Mr. Breitmeyer was general manager of Pfeiffer Brewing Co. for many years.

» MICHAEL BERARDINO has been made president of Fort Pitt Brewing Co., Pittsburgh.

» W. E. CARMICHAEL, who has been superintendent of branches for Geo. A. Hormel & Co., Austin, Minn., for several years, has been appointed zone manager of the company at Houston.

» G. E. FUHRER, Fairmont Creamery Co., has been elected a director of the American Butter Institute, formerly American Association of Creamery Butter Manufacturers.

» DAN F. GERBER, vice-president of Fremont (Mich.) Canning Co., has been elected chairman of National Cherry Week for 1938.

» PROF. H. O. HENDERSON, of the department of dairying, West Virginia University, has been elected president of the new West Virginia Association of Milk Sanitarians.

» E. R. JAGENBURG has established his own business as a manufacturer of fruit product specialties, in Brooklyn, N.Y. Mr. Jagenburg formerly was with Crown Fruit & Extract Co. and later was consultant to an essential oil and extract firm.

» J. R. JENNINGS, formerly chief of the milk division of the Louisville board of health, has gone with Diversey Corp., Chicago, and will assist in the farm quality control program sponsored by the company.

» W. L. KERR is now managing the C. E. Thomas packing plant at Lake Harbor, Fla.

» ARTHUR C. LEUDER is the new president of the reorganized Lubeck Brewing Co., Toledo. John A. Roberts is vice-president and general manager.

» HENRY LOTZ, brewmaster of La Crosse Breweries, Inc., has been named president of the La Crosse branch of Master Brewers' Association.

» MCKAY FOOD PRODUCTS CO., Battle Creek, Mich., organized recently by Eugene H. McKay, former executive of Kellogg Co., has been merged with National Biscuit Co., New York.

» EMIL H. MARTIN has been named president of the Central Wisconsin Cheesemakers', Buttermakers' and Dairymen's Advancement Association for the ninth consecutive year.

» PAUL P. MILLER, General Ice Cream Corp., Schenectady, N.Y., will head the Association of Ice Cream Manufacturers of New York for the ensuing year.

» ALFRED J. MITCHELL has been advanced from vice-president to president of Western Canada Flour Mill Co., Ltd., Toronto.

» EUGENE P. MITCHELL has resigned as vice-president of Washburn-Crosby Co., Inc., Buffalo, the Eastern division of General Mills, Inc.

» ALBERT NATTANSON, formerly with Crosse & Blackwell, at Toronto, is now associated with Helwig & Leitch, Inc., Baltimore. He is in charge of the processing and manufacturing operations in the pickle and relish departments of the company's plants at Baltimore and West Point, Va.

» EDWARD S. RUTTER, formerly with Larsen Baking Co., Brooklyn, N. Y., has become associated with Wilbour D. Tripp & Co., New York. This company will render an accounting service to the food industries.

» DR. O. A. SJOSTROM, head of the sugar division of Corn Products Refining Co., Argo, Ill., celebrated 30 years in the employ of his company by addressing the Corn Products Chemists' Club at Chicago on Dec. 14. His subject was "What the Microscope Tells Us About Corn and Corn Products." A token of honor was presented to him following his address.

» FRED G. TAYLOR, formerly with Sugar Institute of America, New York, and later with Amalgamated Sugar Co., Ogden, Utah, has accepted the position of vice-president and assistant to the general manager of the Utah-Idaho Sugar Co., Salt Lake City.

» JOHN H. TRAINOR, Capital Salt Co., Inc., Baltimore, has been elected president of the Salt Distributors' Association of America.

» HORACE S. TUTHILL, JR., has been appointed superintendent of the Bailey Ave. division of Sheffield Farms Co., Inc., New York.

» GEORGE P. URBAN, JR., has been made treasurer of George Urban Milling Co., Buffalo. He represents the fourth generation of Urbans in the management of this mill.

No Wonder

THE INDUSTRIAL KEMP CARBURETOR

chefs are proud of their handiwork. All we need to do at Kemp to feel the ruddy glow of pride coursing through our veins (and arteries too of course) is to roll some delicious Beech-Nut Product under an enchanted tongue and reflect . . . the Kemp Industrial Carburetor and Kemp burner equipment played their small part in the plant where these are made.

You see, the Beech-Nut people think they can handle certain heating operations* better with Kemp equipment than in any other way . . . and they ought to know.

So it might be that Kemp Equipment would roast nuts for you very nicely too, or bake bread or cook candy or brown your cereal . . . and with profound respect for your pocket book. Who knows?

We don't know, and you don't know. But we can find out, gladly . . . if you'll just ask. Address the **C. M. Kemp Mfg. Co., 405 E. Oliver Street, Baltimore, Md.**

*For Beech-Nut, Kemp roasts peanuts and drys printing ink for those attractive labels.

KEMP of BALTIMORE

DEATHS

» EDGAR ASHBY, 70, president and general manager of Ladoga (Ind.) Canning Co., Dec. 6, in Indianapolis. In the canning business 35 years, Mr. Ashby was a former president of Indiana Canners' Association.

» WILLIAM M. EBLING, 70, founder of the Detroit creamery which bears his name and one of the best known dairymen in Michigan, Dec. 7, in Detroit.

» WILLIAM HENRY FERGUSON, 81, founder with the late George Haskell of Beatrice Creamery Co. and former president of the firm, Nov. 13, in Lincoln, Neb.

» JONAS M. HAMMOND, 71, founder and former president of Simmons & Hammond Mfg. Co., recently consolidated with National Dairy Products Co., in Pasadena, Calif., recently.

» CHARLES H. HOOD, 77, retired president of H. P. Hood & Sons, Inc., Boston, and a son of the founder of the company, Nov. 22, in Beverly, Mass. Mr. Hood, said to be the first to introduce pasteurized milk into New England, was one of the most prominent figures in the dairy industry of the East.

» EDMUND P. KELLY, 44, president of Capital City Products Co., one of the largest oleomargarine manufacturers in the country, Nov. 30, at Columbus, Ohio.

» JOHN B. KLOESS, 55, president and general manager of Richland Milling Co., Belleville, Ill., Nov. 27, at Gordonville, Mo.

» GEORGE E. LEONARD, 54, former owner of the Log Cabin Baking Co., which was purchased by Heilman Baking Co., Dec. 5, at Madison, Wis.

» FRANK MANALE, 67, vice-president and a founder of Dixie Brewing Co., New Orleans, Nov. 29.

» R. R. PERRY, superintendent of bread and cake bakeries, Kroger Grocery & Baking Co., Cincinnati, Nov. 16.

» FRANK VAN CAMP, president of Van Camp Packing Co., and son of the founder, Nov. 24, in Los Angeles. He established seafood packing companies on the West Coast, one of the largest of which is at Terminal Island, Calif.

» FRANK K. YOST, 65, general manager of Hopkinsville (Ky.) Milling Co., recently in Baltimore.

ASSOCIATED INDUSTRIES

» ALLIS-CHALMERS MFG. Co. has opened a regular office in Syracuse.

» AMERICAN ROLLING MILL Co. has named Murray B. Wilson manager of the New York sales district.

» CAMBRIDGE WIRE CLOTH Co. has appointed George B. Fletcher sales engineer for the Pittsburgh territory.

» CRANE Co., Chicago, has formed a division of engineering research, headed by L. W. Wallace. The new division was formed to coordinate all engineering activities of the company.

» FEDERAL MOTOR TRUCK Co., Detroit, has appointed K. M. Schaefer general sales manager, in charge of all domestic sales and advertising activities.

» LINCOLN ELECTRIC Co. has opened a welding sales-engineering office at Atlanta, Ga.

» LINK-BELT Co. has appointed Harold L. Hoefman manager of its plant, warehouse and sales office at Atlanta. George A. Paige has been made manager of the warehouse and sales office in Detroit; Laurance O. Millard, district sales manager at Pittsburgh; Paul V. Wheeler, at Cleveland.

» ROOTS-CONNERSVILLE BLOWER CORP. has appointed additional representatives in Wisconsin and in southwestern Ohio.

» WORTHINGTON-GAMMON METER Co., Harrison, N. J., has appointed W. C. Flanders sales manager.

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SAVES 60%
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PAPER for bundling costs *60% less* than cardboard boxes. Machine bundling will make this immediate saving for you!

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Over a Quarter Billion Packages per day are wrapped on our Machines

(*Continued from page 39*)

cedure for high grade oils and another for low grade oils with a high content of impurities.

If free acidity and slimes content are low, dilute alkali is used at temperatures nearly up to 212 deg. F.; but in cruder and more acid oils strong alkali employed at lower temperatures is preferable. The alkali factor (calculated quantity of sodium hydroxide for exact neutralization = 1) is also varied to suit conditions. If double the calculated quantity is taken, the alkali factor is 2.

Oils containing little or no slime are amply treated at an alkali factor of 1.2, but cruder oils present more difficulty in separating the neutral oil from the soaps formed by neutralization, and a higher alkali factor is necessary. Neutral oil becomes emulsified in the soap solution and is lost, while the degradation of proteins, hydrolysis of phosphatides and resinification of aldehydes use up more of the alkali and increase the refining losses. A crude cottonseed oil may demand an alkali factor as high as 5, while a good coconut, palm, sesame or peanut oil may need only 1.1 and may endure a higher temperature. Strong alkali should be stirred well but not too vigorously into the oil; dilute alkali may be sprayed on, without stirring the oil.

Digest from "Limiting Oil Losses in Neutralization," by R. Dieterle, *Seifensieder-Zeitung*, 64, 632, 1937. (Published in Germany.)

Treating Edible Oils to Improve Flavor

BY MIXING with a sugar mash and fermenting with a yeast or other organism, edible fats and oils can be improved in odor, flavor, consistency and stability. Aside from yeast, the acetic and lactic acid organisms and others may be used for the fermentation, e.g., *B. bulgaricus or Streptococcus thermophilus,* singly or in mixed cultures. By using proteolytic enzymes, the treatment can be applied to seeds from which the oil has not yet been extracted. Raw or rancid lard, tallow, whale oil, linseed, peanut, cottonseed, soy bean and corn oils, fish liver oils and seeds such as soy beans, rapeseed and lupines may be treated.

As described in British Patent 465,111 (granted July 22, 1937, to W. Ekhard, Pankow Berlin), 100 parts whale oil may be mixed with 100 parts of 3 per cent sugar solution inoculated with 5 parts yeast, and emulsified while blowing with air. After fermentation starts, 2 parts sodium sulphite and 0.5 part stannous chloride are added and fermentation is continued, with air blowing, 6 hours at 30 deg. C. (86 deg. F.). Because the treatment imparts to the oil or fat a distinct butter aroma, the method may be used for making margarine by treating the fat before churning. Esters which impart particular aroma effects may also be formed in the fermentation, and special effects can be obtained by introducing selected alcohols (ethyl, butyl or higher) in order to form desired esters.

Grapeseed Oil

SOME COUNTRIES having a well established wine industry have long had the custom of recovering grapeseed oil for edible and industrial uses. This is especially true of France, Italy and Greece. In other countries little or no effort is made to recover the oil. The average oil content of the seeds is about 13–15 per cent, but there is considerable variation as between white and blue grapes, sweet and sour, states of ripeness, etc.

The cold-pressed oil is slightly sweet, with pleasant odor and pale color, and is much like olive oil. Hot-pressed oil or oil from the second pressing is dark and has an undesirable scorched taste. Extracted oil, after refining, has a pleasant nutty flavor and a pale yellow to greenish color.

The low grade oils can be used in soap manufacture, or polymerized for use in varnishes or the like. The grape marc from which the oil is recovered need not be fresh. In fact, moldy marc can be taken from storage and the quality of the oil does not suffer. Only the press cake, which is less valuable, is spoiled. Only very severe rotting is able to penetrate the endosperm and deteriorate the oil. This is an important fact because it means that old stocks of marc can be utilized and that elaborate precautions for protecting the marc are unnecessary. Some of the experiments in this study were made with marc imported from the Argentine, and the quality of the recovered oil was good.

Digest from "Grapeseed Oil," by H. P. Kaufmann and H. Fiedler, *Fette und Seifen*, 44, 286, 1937. (Published in Germany.)

SUGAR

Refining Sugar

AN IMPROVED PROCEDURE in sugar refining consists in mixing crude sugar with a hot syrup (preferably above 140 deg. F.) which is approximately saturated, then rapidly heating the magma to a specified temperature immediately before centrifuging. In this operation, the magma is not diluted. The crystals in the centrifuge are washed by spraying with hot water, which must be above the temperature of the magma. As the process is disclosed in British Patent 466,142 (granted Aug. 12, 1937, to R. Haddan, Western States Machine Co., Salt Lake City), crude sugar is fed from a bin to a mixer-conveyor where it is mixed with the hot, approximately-saturated syrup.

The resulting magma is passed through crusher rolls and thence to a centrifugal mixer-trough in which the stirrers are heated. From this trough, the hot magma goes to the centrifuges, which discharge the syrup to receiver tanks. After being washed with hot water, the crystals are discharged from the centrifuge to a conveyor. The syrup and wash water may be returned to the tank from which the hot saturated syrup is taken, or they may be diverted to other uses. The hot syrup is kept approximately at the saturation point in a tank heated by a steam coil. An air jet is used for stirring the liquid and accelerating the removal of water by vaporization.

Acidity in Sugar Refining

THERE IS A GREAT DEAL of both theoretical and practical importance in the measurement and control of pH (acidity and alkalinity) in the various operations of sugar refining. Inversion, losses due to decomposition or discoloration, and corrosion of refinery equipment are all influenced, favorably or unfavorably, by changes in acidity or alkalinity. Moreover, pH measurement offers a means for determining the progress of reactions at high temperatures. Among the various methods for determining the pH of solutions, the one most suited to sugar-refinery practice is direct electrometric measurement, and special apparatus is available for the purpose.

Many determinations have been made, at temperatures up to 80 deg. C., in pure sugar solutions buffered with sodium hydroxide and glycine (or a borate or citrate), and in juices in the refining stages of diffusion, juice purification, evaporation, liming, etc. The lower the purity of the juice, the more sensitive is the pH value to the type of buffer employed in the determination. The higher the sugar concentration, the less sensitive is the acidity to the increase which results from heating the juice. Tabulated data and curve charts based on the large accumulation of numerical determinations are helpful in sugar-refining control work.

Digest from "Measurements of pH in Sugar Refinery Juices at Elevated Temperatures," by O. Spengler, S. Böttger and A. Höfer, *Zeitschrift der Wirtschaftsgruppe Zuckerindustrie*, 87, 245, 1937. (Published in Germany.)

MEATS

Liver and Anemia

AS PART of a program of research on the active principles which make liver beneficial in pernicious anemia, some liver concentrates were analyzed. These concentrates were so potent that doses as small as 10 to 20 milligrams (1/7 to 2/7 grain) were sufficient to give a pronounced anti-anemic effect. Tests with numerous concentrates showed that there is a parallelism between their potency and

the phosphorus content, which was about 3.8 per cent in the most potent of the concentrates. Adenine and a pentose were also present. This, coupled with the evidence that a phosphorus compound is essential to the anti-anemic action, makes it highly probable that liver contains a nucleotide of adenine, and that this substance is still present in the concentrates which are effective against pernicious anemia. The presumption is that the adenine nucleotide is itself the active principle, or at least forms an integral part thereof, but actual proof of this conclusion must await further research. Adenine is a base derived from nucleic acid, and its nucleotides are formed by combination with a sugar (in this case a pentose occurring in liver) and phosphoric acid.

Digest from "A Component of Highly Anti-Anemic Liver Preparations," by P. Karrer, P. Frei and H. Fritzsche, *Helvetica Chimica Acta 20, 622*, 1937. (Published in Switzerland.)

Short Freezing Period Has Small Effect on Beef

RECENT TESTS indicate that short-time freezing of beef does not affect the drip and tenderness of the cooked meat. The cuts used were selected from medium grade steers, ripened for ten days, frozen at —0.4 deg. F. for a total of only 30 hours. Excessive evaporation was minimized by use of moisture-proof paper wrappers. The 9–10 (average 3.6 lb.) and the 11–12 (average 2.8 lb.) rolled rib roasts were used. The thawing was carried at two temperatures: 347 deg. F. and 75.2 to 77 deg. F., and was considered complete when the temperature at center reached 41 deg. F.

The results follow: the total moisture, drip, and tenderness of the cooked beef were not affected by freezing or method of thawing. The press fluid content of unfrozen beef was appreciably higher than that of the frozen beef. Unfrozen beef had a lower total loss than the frozen beef.

Digest from "Effect of Freezing and Thawing Beef Muscle upon Press Fluid, Losses and Tenderness," by Pauline Paul and Alice M. Child, Minnesota Agricultural Exp. Station, *Food Research 2*, 339, 1937.

YEAST

Hormone-Fed Yeasts

ADDITION OF AUXINE, the standardized ovarial hormone, to growing yeast at a definite stage in the propagation cycle is the newest patented step to get higher yields and a stronger yeast that is normally obtained from a given quantity of seed yeast.

As disclosed in U. S. Patent No. 2,087,059 granted July 13, 1937, the addition of 30,000 mice units of duxine, the growth-promoting fraction of the pituitary anterior lobe also found in the wheat germ) to the fourth generation of 2 kilograms (4.41 lb.) seed yeast in sugar-containing solution increases final yield of yeast from 90 kg. (198.4 lb.) to 132. kg. (291 lb.); an increased yield of 46 2/3 per cent. Also the albumen content of hormone-fed yeast is only 50 per cent compared with 57 per cent of the hormone-free yeast. The alcohol content of the hormone-containing yeast mash is zero while the mash of hormone-free yeast is 2.5 per cent by volume.

When tested for gas production, using the same flour for both yeasts, the hormone-fed yeast exhibited its raising power in 59 minutes whereas 76 minutes were required for the hormone-free yeast.

Should economy in seed yeast expense be desired, addition of the hormone makes the 90 kg. production possible with less than the 2 kg. of seed yeast. The patent was granted to Ernst Kottlors, Mannheim, Germany.

Making Compressed Yeast

YEAST for making compressed yeast is prepared in successive cultures, first in a medium to which soluble nitrogenous nutrients have been added. As disclosed in German Patent 641,753 (granted Feb. 12, 1937 to Wilhelm Knappe), these soluble nutrients are obtained by digesting protein materials of vegetable origin with dilute (1-10 per cent) phosphoric acid. The first culture medium also contains sugars. It is kept below 61 deg. F. The next culture medium contains, in addition to protein digested with phosphoric acid, selected potassium compounds and an excess of phosphoric acid. Maltose may also be added if desired. The temperature during this stage is kept below 57 deg. F. In both culture stages phosphoric acid is used for adjusting and maintaining the most favorable acidity.

MISCELLANEOUS

More Data on Tank Agriculture—"Hydroponics"

HYDROPONICS is the name for the new method of crop growing in water solutions, giving remarkably large yields. In 100 sq.ft. of solution, Dr. W. F. Gericke raised 1,224 lb. of tomatoes from chemicals costing 98 cents. A plot of 1/300 acre produced 7 bu. potatoes, equivalent to 2,100 bu. per acre.

Commercial installations of the new system in the East cost 20 cents per sq.ft. as fixed investment. In California the cost seems to be close to 10 cents per sq.ft. Both figures are for outdoor tanks. (Indoor tanks would cost this figure plus greenhouse costs—about $1.50 per sq.ft.—Ed.) On a per acre basis, outside tanks cost $4,000–$8,000 per acre.

Digest from "Dr. Gericke Explains Water Culture," by J. H. Currie, *Pacific Rural Press* 134, 488, 1937 (No. 6, 1937). (Published in San Francisco.

New Light on Cooking Potatoes

INTERESTING RESULTS are shown by tests carried for the past three years with a penetrometer to determine the degree of "done-ness" of potatoes on the basis of penetration by pointed instrument. They reveal that the higher the starch content, the lower the penetration and, hence, the less softening produced by cooking.

Another series of experiments were similarly carried out last spring on five varieties of potatoes grown at the same location, but these samples were cooked 60 minutes. This prolonged cooking produced some rather curious results. The potatoes cooked "done" in 25 minutes as before, but, as cooking was continued, the softening was temporarily arrested. And in some cases it was actually followed by a slight hardening period. This would seem to indicate that the cooking process is not merely one of gelatinization of the starch because the first change is completed when the potato is cooked "done," while the second change progresses slowly and even temporarily reverses, ultimately yielding a greater softness than the first.

Digest from "Potato Mealiness and Changes in Softness on Cooking," by Mark A. Barmore, Colorado Agricultural Exp. Station, *Food Research 2*, 377, 1937.

Fermented Cherry Mash Has Complex Aroma

ANALYSIS OF FERMENTED CHERRY MASH revealed the presence of methylethyl ketone, which cannot itself be responsible for the characteristic aroma or bouquet but is probably an intermediate stage in the formation of methylacetyl carbinol and diacetyl. Benzyl alcohol was also found, but the true source of the bouquet does not reside in any of these. The actual source is a complex mixture of esters derived from the lower members of the aliphatic acids (acetic, propionic and butyric acids as principal representatives) and lower alcohols (chiefly ethyl, isobutyl and isoamyl alcohols). Esters of benzyl alcohol, and probably also of terpineol, are included in the mixture. No lactones were found although their presence might have been expected, especially in a neutral, high-boiling, oily fraction which was obtained from the mash. This fraction had a sweet, pleasant odor. The source of aroma in cherry mash has thus been qualitatively but not quantitatively characterized.

Digest from "Aroma Substances in Cherry Mash," by E. Washer and G. Mosca, *Zeitschrift fur Untersuchung der Lebensmittel* 74, 134, 1937. (Published in Germany.)

Food Plant Waste Disposal

(*Continued from page 21*)

Daily removal of sludge is essential.

Studies of treatment of pea cannery wastes by use of a trickling filter, both with and without chemical precipitation in advance of filtration, were started in 1928. The data and observations indicated that, by the use of the seeding procedure outlined, the treatment efficiency of a trickling filter may be, in large part, established before canning starts.

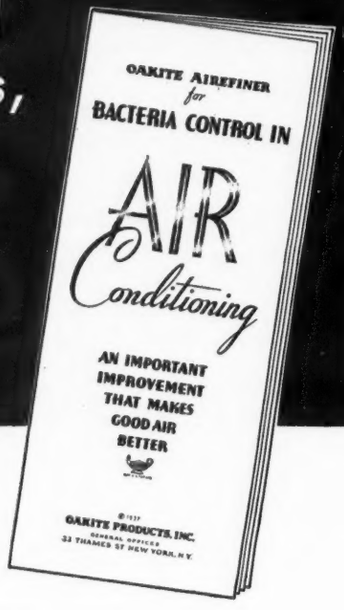
Results of the trickling filter studies were used as the basis of a plan for secondary treatment of sewage recently carried out in a Wisconsin municipality, whereby wastes from a cannery (after chemical treatment) are discharged into the dosing tank of the new trickling filter at the city plant. From results obtained to date this arrangement has been successful in alleviating a very serious pollution problem.

The discharge of the cannery waste by separate pipe line into the dosing tank of a trickling filter at a municipal plant is unnecessary, if an ample detention period is available in the primary tanks, and provided that sufficient filter capacity for the combination of chemically treated cannery wastes and the domestic sewage is available. This has been shown by operating results obtained in another municipality.

Studies have also been conducted of complete treatment of cannery wastes along with domestic sewage at activated sludge plants. Ample aeration capacity is essential. Tests indicate no interference with the digestion, or breaking down of the sludge produced. In each situation the cannery wastes are given pretreatment by screening and chemical precipitation.

Much work remains to be accomplished both in applying present knowledge; and in continuing the research to improve existing, and to develop new facilities to permit still more efficient and economical utilization or treatment of canning plant wastes. It has been shown that this work can most advantageously be performed with the support and cooperation of the National Canners Association and the various State Canners Associations.

How to control bacteria growths, slime and algae accumulations in air conditioning equipment!



Here is a booklet that tells how slime and algae growths on surfaces of recirculating type of equipment are effectively controlled; how you can keep odors out of air which has been conditioned; how bactericidal treatment of water used to wash air is easily and economically accomplished.

Preventing Corrosion and Water Scale

In various localities either water conditions or air pollution are contributing factors to water scale formation and corrosion of surfaces of equipment. This booklet tells how these problems may be successfully and economically solved.

If you have already installed or plan to install air conditioning equipment in your plant, you owe it to yourself to read about an important NEW development... OAKITE AIREFINER, that marks another forward step in air conditioning and in the safeguarding of quality in food products.

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Every food plant executive and engineer should have a copy of this interesting NEW 16-page booklet. Write for it today . . . there is no obligation whatsoever.

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OAKITE CERTIFIED CLEANING
MATERIALS & METHODS FOR EVERY CLEANING REQUIREMENT

Bottling Plant Lighting

(*Continued from page 11*)

vided from a general lighting system, and that from 5 to 10 foot-candles be provided in the general storage area to facilitate picking out the cases desired. In the shipping department, practically the same conditions exist, and the same type of lighting should be provided.

The water-treatment plant and similar equipment are frequently placed in the most out-of-the-way section of the plant, and usually are forgotten until they need attention. But these areas should be lighted with an intensity of at least 5 to 10 foot-candles to facilitate general plant housekeeping.

It is suggested that, in the average plant, it would be highly desirable to have several reflectors—probably of the RLM type or the silvered-bowl diffuser type—which could be moved from section to section and hung up where maintenance work or other conditions require their use.

Lighting serves two important purposes in the syrup room and its surroundings, such as the sugar-storage room. First, there is need for absolute cleanliness. Second, it is neces-

sary to see just what various bottles contain and just exactly what the labels say. An indirect-lighting installation of 20 foot-candles in the laboratory or the syrup-mixing room is desirable to provide the best visual conditions.

It is recommended that lighting of approximately 20 foot-candles from indirect luminaires, mounted on the ceiling, be provided for all office areas. To obtain an efficient indirect-lighting system, it is necessary to have a white ceiling and fairly light side walls. These factors, added to the tendency of the luminaire to collect dust, make it extremely necessary to provide good maintenance in this type of lighting.

There are a number of factors to consider in choosing luminaires for offices, the most important being efficiency, ease of maintenance, distribution and appearance. The most efficient of all units now on the market are the ones which employ the silvered-bowl lamp. With this type of equipment, the lamp itself is the reflector and the luminaire is merely a shield which improves the appearance of the light source and protects the eye from the brightness of the upper part of the lamp.

The cleaning of lighting equipment and lamps of dust and dirt that settle upon them is necessary throughout the entire factory area. Depending upon the cleanliness of each location, it is recommended that this be done every six to eight weeks to maintain the efficiency of the lighting system. Even a very thin layer of dust will decrease the efficiency of a lighting system 30 to 40 per cent, although to the eye the equipment looks practically clean. For this reason, it is desirable to place cleaning on a definite schedule.

The efficient and economical production of light requires wiring of sufficient capacity to carry electrical energy from the distribution panelboard to the lamp socket without excessive voltage drop and power loss in the wiring. A one-volt drop in voltage reduces the light output of an incandescent lamp about 3½ per cent, and a five-volt drop lowers it about 16 per cent. When the loss in voltage is caused by an inadequate wiring system, which has an additional loss of wattage in the wiring, it becomes doubly inefficient. The difference between the initial cost of an undersized wiring job and one of thoroughly adequate capacity is not as a rule very great, and the subsequent saving is sufficient to make it profitable. In general, wiring to carry double the load can be installed initially at about one-third extra cost. Frequently, in cases where the management has decided that better lighting should be provided, the wiring is not adequate to carry an increased load. For this reason it is always desirable to provide extra capacity when doing any sort of wiring job.

The greatest value of good lighting is in the things which don't happen. In other words, if an accident has been averted by good lighting, we frequently do not know that it would have been an accident. W. Dean Keifer, director of the industrial division of the National Safety Council, has estimated that poor lighting is probably the direct cause of 5 per cent and a contributing cause of 20 per cent of all industrial accidents. The average disabling injury will cost the company $1,000. A prevention of one such accident would pay for the installation of good lighting over several thousand square feet of floor space.

To prevent contamination of the product, all contact parts of Horix Fillers can be made from corrosion-resisting metals. After operation every part of the filling valves, feed line, and tank can be made accessible for cleaning, by brushing if necessary.

Exclusive Gravity-Vacuum filling system and simplified valves give positive drip-free shut-off and prevent waste due to defective bottles.

Horix Fillers are made in a number of different types and sizes for wines, whisky, fruit juices, and other liquids. Write for complete information.

HORIX MANUFACTURING CO.
PITTSBURGH, PENNA.
CONVEYORS and FILLERS

Quality Separation

(*Continued from page 9*)

is the true one but there are enough exceptions and unexplained misbehavior of the operation to make anybody wonder.

When this problem was put up to Dr. D. K. Tressler of the Geneva (N.Y.) Agricultural Experiment Station in the spring of 1937, he agreed that the facts ought to be ascertained. And it is to be hoped that his organization will be able to follow the changes in pea density until the peas actually become too tough for canning or freezing.

Before leaving this aspect of the subject it should be pointed out that peas of different varieties should be investigated. It may be that some differences of behavior may occur in some varieties that do not occur in others. And then there is the problem of what density changes of the raw material may occur as a result of adverse weather—either too wet or too dry—or as a result of root rot, insect infestation and other harmful conditions.

For anyone to take an arbitrary stand on the debated points is to ignore a lot of conflicting evidence. It may take years to learn all the facts; on the other hand, it may require less.

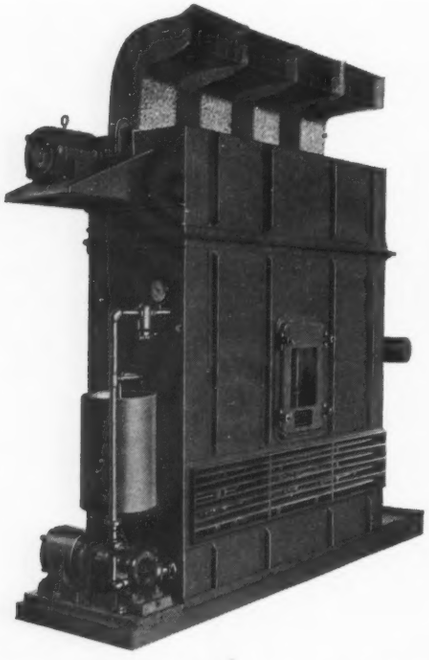
Economic Forces Influencing Automatic Quality Grading

Before discussing the engineering side of this form of grading it is well to understand the economic forces that are at work in this field. Without question the biggest impetus for automatic quality separation has come from the firms engaged in the production and distribution of frozen vegetables. Their policies have been to pack only the finest quality in frozen form. The public likes this quality well enough to pay the necessary price. Therefore the economic force is there to make it worth while to separate the best quality from the lesser grades of quality.

Another factor in the situation is that frozen vegetables require the same facilities and treatment up to the point of placing the raw material in packages that are required for canned foods. This makes it very profitable for freezers to associate in a cooperative venture with canners, or for canners to take up preservation by freezing. One set of equipment will serve both parties. Here is valid reason for using automatic quality separation.

Still another economic incentive for using the method is its cost-saving possibilities—a feature that will be described later. At this point it is sufficient to say that one of these machines can be made to operate so as to remove all the splits, skins, thistles and other floatable material which would ordinarily require 15 to 20 women at inspection belts to take out. At one three-line plant there are no "pickers," where ordinarily there would be about 45 or 60 women, simply because inspection has been mechanized. Whether all hand-picking can be eliminated by this form of mechanization is, however, a moot question with many other canners.

One of the complaints sometimes heard is given as the reason why quality separation is *not* used. This is that "you can't get enough more money for fancy (No. 1 quality) peas over extra-standard peas (No. 2 quality) to pay for the bother and higher costs." To which comment a prominent canner replied, "If a man cannot get a fancy price for a fancy pea he had better retire from business—or, perhaps,



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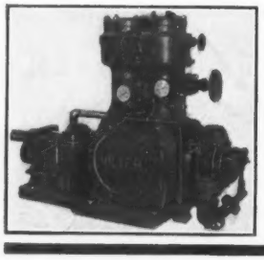

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hire himself a good salesmanager."

Aside from his comment, however, there remains the fact that among the most enthusiastic supporters of automatic quality separators are those who sell part of their production through the frozen food market, and thereby get the largest price. And also that those who are most skeptical about its merits seem to be those who have not given it an adequate trial if indeed they have used it at all. As one man put it, "We regard it as impossible to operate a quality plant without these graders (quality separators). He who speaks adversely of this operation is speaking from a lack of knowledge."

Quality Separating Equipment

In 1937 there were on the market five makes of quality separators, or graders as they are called in the canning field. These were the Lewis, manufactured by Food Machinery Corp.; the Chisholm-Ryder, manufactured by Chisholm-Ryder Company, Inc.; the Olney, manufactured by Olney & Floyd, Inc.; the Hansen, manufactured by Hansen Canning Machine Co.; and the Berlin-Chapman, manufactured by the Berlin-Chapman Co. In addition to these commercial machines, there were other machines in private hands which were undergoing experimental development, but about which no information is given out for publication.

A brief description of the operating principle is given herewith. No comparisons of the machines are made with respect to capacity or performance; only the scheme of operation is described. All of them act on the flotation principle.

In all quality separators, the effort is to introduce a stream of peas—in some cases peas which have been blanched (parboiled and, hence, degassed), and in other cases raw peas, into a brine of suitable, density. In some way, the brine and peas must be left quiescent for a few seconds so that the force of gravity may effect the desired separation. The lighter peas will rise toward the surface, the heavier—and presumably harder—peas will sink toward the bottom, and sometimes there may also be an intermediate or middle group which neither rises nor sinks. Some machines take the latter group into account, others do not. Whether there is any real importance to be attached to the intermediate group is a matter on which the users do not entirely agree. There are vigorous supporters of either viewpoint.

In the following descriptive paragraphs no significance is to be attached to the order in which the various graders are mentioned.

Lewis

In the Lewis machine the raw material is submerged in a solution of brine which travels in a slow circular direction in a large funnel-shaped tank. The gentle circular motion is obtained by the tangential direction of the incoming brine from the circulating pump—a centrifugal. In Fig. 7 can be seen the scheme of effecting a separation of light and heavy peas. Light ones float to an overflow discharge port and are diverted overboard by a set of baffles, while the heavy ones sink to the bottom of the funnel and are ejected by a stream of brine, as shown. Both grades of quality pass over suitable screens to separate the peas from the brine. The peas go on to their respective rinsing operations in order to remove any adhering brine, but the separated brine goes back to the storage reservoir for re-use.

Olney

In one respect the Olney grader may be compared to the Lewis, for both

He Couldn't "Take It!"

The Dodo couldn't adapt himself to changing conditions. Now he's "gone with the wind."

Yesterday's adhesives aren't good enough for today's exacting needs. Don't be a Dodo.

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employ a funnel-shaped separating tank. But the Olney is equipped with a revolving feed where the Lewis feed is at a fixed point. The Olney feed is a double ended rotating distributing device which lowers a stream of peas in brine gently into a nearly quiescent brine of the same density. This is done by allowing them to trickle down in a stream of brine over a retreating series of inclined "fingers" so arranged and so timed that the horizontal motion of the peas with respect to the quiescent brine is nearly zero. The peas merely drop gently into the brine, and either sink or float. (See Fig. 8.)

At the next passage of the arms of the rotating device the floaters are skimmed off together with considerable brine and pass out a revolving central spout to a revolving screen which removes the brine and later washes the peas. Sinkers, on the other hand, fall to the bottom of the funnel and are ejected by a forceful stream of brine into another revolving screen set alongside the first. This ejector part of the mechanism somewhat resembles that of the Lewis grader. Brine is circulated by a centrifugal pump.

Chisholm-Ryder

In the Chisholm-Ryder machine the separating unit is a long trough in the form of a helical spiral into the center of which peas and brine are fed. By passing five times around, the mixture traverses a distance of about 44 ft. with great rapidity during which the quality separation takes place. (See Fig. 9 for scheme of operation.) This grader is designed to make a three-part separation but intermediate grades are seldom met. The brine is recovered by allowing the peas and brine to slide down an inclined rod-screen. Brine circulation is accomplished by a variable-discharge centrifugal pump.

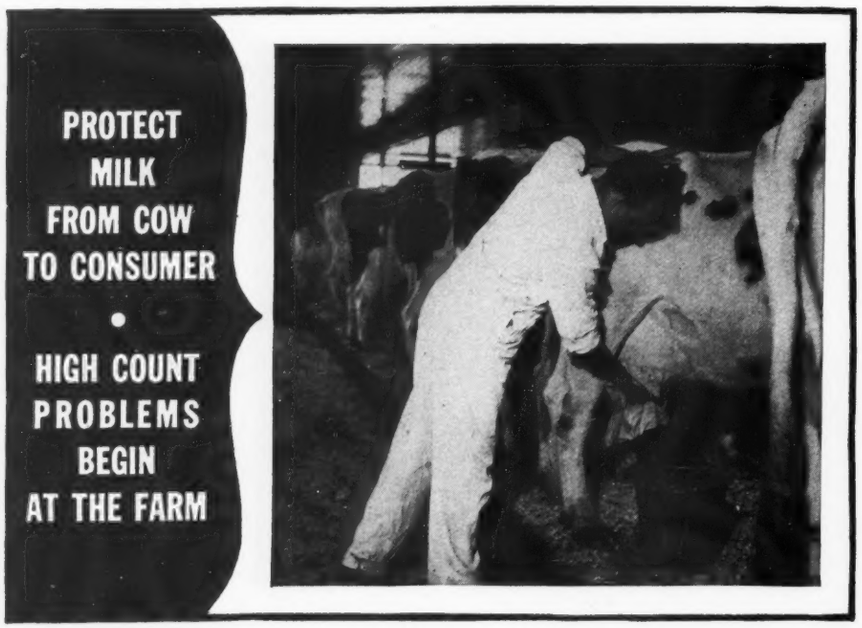
Hansen

The Hansen method is that of enclosing the peas in a series of self opening and closing perforated receptacles or boxes inside the rim of an inclined "wheel." These boxes are filled with the material to be graded, then closed, and next pass slowly down into the brine. (See Fig. 4 and 5) The movement is very gentle, the usual rising or sinking takes place in a quarter turn after which the boxes pass through a series of stationary flat plates which separates the top and bottom halves of the boxes. This is made possible by slots in their sides through which the plates project and is accomplished while the peas are still submerged. In effect, the separated floaters and sinkers are separated and captured before the inclined circular movement lifts them out of the brine. The next step is to open the boxes and discharge the two grades separately. Usually two machines are mounted in tandem and operate on two different brine densities thus effecting a three-part separation. Next follows rinsing of the peas.

Berlin-Chapman

Here is a machine that introduces brine and peas into a Venturi-shaped chamber which produces the necessary quiescent period. Space does not permit an explanation here of the Venturi principle. It is a well-known engineering principle. Sinkers fall into the bottom trough and are ejected by a brine jet as in the Lewis and Olney machines. Floaters are carried over into a suitable trough. (See Fig. 6.) Both streams of peas are separated from the brine in a revolving screen and then rinsed with water. The brine, is, of course, reused.

(Part II will appear in February)



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HTH-15 THE LOW-COST WAY TO LOW-COUNT MILK

Mrs. Consumer Thinks Out Loud

(*Continued from page 25*)

There is one national trend that needs serious consideration. America is health conscious and speaks more or less glibly in terms of diets, vitamins and minerals. Products that coincide with this trend will have an ever wider patronage, but —and here is a real consumer complaint backed by the managers of some of the largest retail stores—do not try to make a popular appeal by stating vitamins and mineral content in hazy and ambiguous terms. Make this content a matter of test and so state. Then, gentlemen, the world of feminine consumers will be your real friend and defender. In this connection, there is a definite complaint regarding the fact that the best-quality canned fruits are put up in the sweetest syrups, so your health-conscious consumer is penalized as to quality, as she wishes a less-sweet product.

There are some specific complaints that merit your attention. The major one is the lack of impervious wrappers on packages. This results in spilling and spoiling, in financial loss to the retailer if it happens on his premises, and in a dissatisfied consumer, probably a lost consumer if it happens during or after home delivery. Use adequate packages.

Another complaint that applies to consumers dealing with smaller retailers is that desired brands and products are not available. This results in substitutions which frequently become permanent. Since we consumers have not been able to clear up the problem, it is clear that manufacturers must if they wish us to use their product.

Investigation has shown that there are several major causes. Packages and tins frequently are not sold in less than lots of 80 or 100, too much for the average retail store to dispose of. Sell in smaller lots. Also check with your distributors on the frequency of their salesmen's visits and the frequency of deliveries to smaller retailers. Much as the consumer may like your product, if it is not available in her neighborhood store when and as often as she wishes it, she will soon switch to a similar product that is available. It is your job to better your distribution.

We complain about your contests. Check-ups with stores, both large and small, as well as individual consumers, show that the participants are rarely customers— they are usually either professional answerers or students—and the actual consumption rate for the product is not increased beyond the continuance of the contest. Meantime, your real customer, in her present questioning frame of mind, wonders why such a contest is necessary and looks around suspiciously for a substitute. Money spent in contests might, from both your standpoint and ours, be better spent in giving slight reductions in the price to thrifty consumers who would buy in lots of 12 or 24 as a result. Your object should be permanent, all-season customers.

We wish you would put your emphasis on flavor rather than looks. Gentlemen may like their women beautiful but dumb, but women want their food not merely beautiful but tasty. If they must choose, they prefer flavor.

We wish you would give us the facts in your advertisements and on your packages.

We wish you would put more emphasis on the use-value of your product.

We wish you would meet with us in a joint council so that we could discuss our mutual problems and through cooperation, and where necessary through compromise, solve them.

BOOKS RECEIVED

CHEMICAL ENGINEERING CATALOG, 1937. Published by Reinhold Publishing Corp., 330 West 42d St., New York, N. Y. 1,034 pages; 8¾x11¼ in.; cloth. Free.

Compiled as a "buyers' guide of the process industries," this catalog contains data on equipment, chemicals, raw materials and laboratory supplies used in the industries employing chemical processes of manufacture. It has classified indexes of the products, of the names of the suppliers and of the tradenames of the products. The catalog also contains a section on technical books which covers approximately 2,600 publications.

CACAO FERMENTATION. By Arthur W. Knapp, chief chemist, Messrs. Cadbury Bros., Ltd. Published by John Bale, Sons & Curnow, Ltd., 83–91 Great Titchfield St., W. 1, London, England, 1937. 171 pages; 5¾x9 in.; cloth. Price 10s. (about $2.40).

Food manufacturers, of course, are not engaged in the fermentation of cacao, this being done by the tropical planters who grow the bean. But users of the finished cacao bean should have an understanding of the processes involved. This not only will enable them to understand better the nature and characteristics of the product which they use but will put them in a position to influence an improvement in the fermentation of cacao. Covering the subject in a scientific manner, this book includes a brief review of published knowledge of cacao fermentation and additional information drawn from the experience of the author.

SUPPLEMENT TO MANAGEMENT BIBLIOGRAPHY. Complied by R. M. Berg. Published by American Society of Mechanical Engineers, 29 West 39th St., New York, 1937. 88 pages; 7¾x10½ in.; paper. Price $1.50. Some 2,500 items on all phases of industrial management are listed, these covering the years 1931–35.

AMERICA'S COOK BOOK. Compiled by the Home Institute of The New York *Herald Tribune*. Published by Charles Scribner's Sons, 597 Fifth Ave., New York, N. Y., 1937. 1006 pages; 6x8½ in.; cloth. Price $2.50.

Tested recipes for more than 3,000 different dishes, new and old, are given, these having been selected from a fund of 800,000. The book, of course, was prepared for the "kitchen mechanics" of American homes. But the large number of recipes in it should make it of practical value to those in the food industries whose responsibility it is to develop new products or to suggest new or varied uses for products already in existence. If the book contains recipes for foods which consumers like, it ought to be helpful to the manufacturer who is trying to sell people something to eat.

INDEX TO THE LITERATURE OF FOOD INVESTIGATION, Vol. 7, No. 1, March, 1935. Published by the Department of Scientific and Industrial Research, 16 Old Queen St., Westminster, S. W. 1, London, England, 1937. 371 pages; 6x9½ in.; paper. Price 5s. (approximately $1.20). References to scientific material published in more than 100 publications of the world are contained in this index.

NUTRITIVE ASPECTS OF CANNED FOODS. Published by American Can Co., 230 Park Ave., New York, N. Y., 1937. 110 pages; 6¼x9 in.; cloth. Free. This contains a bibliography of scientific reports and tables of food data helpful to those engaged in the distribution of canned foods.

PERMEABILITY OF MEMBRANES TO WATER VAPOR WITH SPECIAL REF-

TO PACKAGING MATERIALS. By Frederick T. Carson. Published by U.S. Department of Agriculture. 19 pages; 5⅞x9in.; paper. Price 5 cents. For sale by Superintendent of Documents, Washington, D.C.

INDUSTRIAL & COMMERCIAL BUILDINGS. Published by Albert Kahn, Inc., New Center Building, Detroit, 1937. 140 pages; 11¼x8⅞ in.; cloth. Free. Large illustrations of the architecture of 126 important industrial and commercial buildings make up the content of this book.

INDUSTRIAL SHOP LIGHTING. Published by National Safety Council, 20 North Wacker Drive, Chicago, Ill., 1937. 12 pages; 8½x11 in. This "Safe Practices Pamphlet No. 22" discusses lighting practices conducive to safety and lists standards of illumination for specific industrial operations.

PATENTS

Pineapple Cylinders Cut Into Slices or Finger Segments and Solid-Packed Into Cans for Sealing In One Machine—John Daniel Le Frank, Maplewood, N. J., to American Can Co., New York, N. Y. No. 2,092,763. Sept. 14, 1937.

Pineapple Cylinders Cut Into Finger Segments Inserted as Solid Pack Into Cans Which are Uprighted Into Position for Sealing In One High Speed Automatic Machine—Ronald E. J. Nordquist and John Daniel Le Frank, Maplewood, N. J., to American Can Co., New York, N. Y. No. 2,092,773. Sept. 14, 1937.

Corn Starch Conversion Products Made By Treating Starch and Insoluble Gluten Material With Highly Ionizable Acid, Neutralizing to Coagulate Proteins, Filtering, and Concentrating—Raymond E. Daly and James F. Walsh, Chicago, Ill., to American Maize-Products Co. No. 2,094,558. Sept. 28, 1937.

Vinegar Made in a Circulating Generator Equipped With an Automatic Mash Feeder and Cooler—Heinrich Frings, Bonn-on-the-Rhine, Germany, to Standard Brands Inc., New York, N. Y. No. 2,094,592. Oct. 5, 1937.

Frozen Confection in Bulk Block Form Divided Into Individual Service Bricks and Placed on Sticks by Mechanical Means—Swan F. Anderson to Fred L. Borchert, Rockford, Ill. No. 2,094,769. Oct. 5, 1937.

Spinach and Similar Vegetables Blanched For Canning by Treatment With Hot Liquid Spray Supplied Under Pressure in Excess of 250 lb. Per Sq. In.—William de Back to Food Machinery Corp., San Jose, Calif. No. 2,094,874. Oct. 5, 1937.

Walnuts Hulled by Mechanical Means in a Unit Using a Flat Wire Brush and a Stationary Support—William E. Formway, Los Altos, Calif. No. 2,094,880. Oct. 5, 1937.

Packages For Food Enclosed in a Wrapper So That Overlapping Portion Discloses Identifying Symbol on Underlying Portion of Wrap But Obscuring Symbols Not Applicable to Specific Package—Norman Kraft, Wilmette, Ill., to Kraft-Phenix Cheese Corp., Chicago, Ill. No. 2,095,260. Oct. 12, 1937.

Meat Masses Packaged Under Molding Pressures in Fabric Bags Having External Seams Lengthwise on Bags and Across One End That May be Closed by Rip Stitching Capable of Being Opened From Outside—George D. Morgan, Richmond, Va. No. 2,095,510. Oct. 12, 1937.

Pectin-Containing Fruit Material Processed To Give a Fiber-Containing Product Standardized in Gel Strength Which Upon Acidulated Water Extraction Gives an Extract of Pre-determined Jellifying Strength—William Abner Rooker, Martinsburg, W. Va., to National Fruit Products Co., Inc., Washington, D. C. No. 2,095,617. Oct. 12, 1937.

Cereal Starch and Powdered Milk Mixture Gelatinized by Cooking, Converted With Diastase, Into Maltose Fermented With Yeast, and Inoculated With Lactic Bacilli to Give an Adhesive Syrup Containing Substantial Quantities of Vitamin B, Lactic Acid, and Beneficial Enzymes—George A. Jeffreys, Calcium, N. Y. No. 2,095,638. Oct. 12, 1937.

Removable Slicer For Bread Wrapping Machine—Frederick C. Gladeck to American Machine & Foundry Co., Brooklyn, N. Y. No. 2,095,694. Oct. 12, 1937.

Doughnuts Cooked In a Deep Frying Unit Equipped With a Chain Traveling in a Closed Circuit and Fitted With Paddles Which Serve as Receiving Bases For Freshly Formed Doughnuts as Well as to Progress Cooking Doughnuts Length of Frying Pan—Charles E. Carpenter, Chicago, Ill., to Alexander S. T. Lagaard, Minneapolis, Minn. No. 2,095,731. Oct. 12, 1937.

Lard Stabilized Against Rancidity by Use of Distillate Obtained Through De-odorization of Hydrogenated Sesame Seed Oil—Donald P. Grettie to Industrial Patents Corp., Chicago, Ill. No. 2,095,740. Oct. 12, 1937.

Cream Higher Than 65 Per Cent Concentration Obtained by Centrifuging Sour Milk Standardized to an Acidity of Between 0.10 and 0.22 Per Cent, Heated to Above 145 deg. F. and Treated by a Small Amount of Sodium Citrate—Alfred O. Shaw, Malta, Idaho, to Milk Processes Inc., Philadelphia, Pa. No. 2,095,767. Oct. 12, 1937.

Dough Improver For Yeast-Leavened Bread Comprised of a Baking Acid, an Oxidizing Halogen Compound, and a Water Soluble Vanadium Compound in Which the Vanadium is Present in Approximately 125 Parts Per Million of the Baking Acid—Charles H. MacIntosh, Kansas City, Mo., to Standard Brands Inc., New York, N. Y. No. 2,095,992. Oct. 19, 1937.

Vitamin D Bread Made by Using Shortening Containing Small Amount of Vegetable Oil Having a Known Content of Activated Ergosterol—Frederick Fitz Gerald Tisdall, Toronto, Ontario, Canada, to General Baking Company, New York, N. Y. No. 2,096,213. Oct. 19, 1937.

Sausage Packaged in Artificial Casings Formed by a Spirally Wound Strip of Transparent Cellulose Which is Removable by Unwinding—Ralph L. Atkinson to Transparent Package Co., Chicago, Ill. No. 2,096,221. Oct. 19, 1937.

Maltose and Dextrine Mixture Made by Adding Malt to Suspension of Starchy Material, Adjusting Acidity to About pH 6.0-6.6, Holding at 55 to 75 Deg. C. Until Starch and Soluble Proteins Are Converted, Boiled, and Filtered—Vernon Jersey to S. M. A. Corporation, Cleveland, Ohio. No. 2,096,549. Oct. 19, 1937.

Cheeses Sliced and Packed Into Cans by Mechanical Means—Elmer G. Lantz, Salem, Ore. No. 2,096,641. Oct. 19, 1937.

Beer Coil Cleaning Device—David Haldane to Brass Products Co., Chicago, Ill. No. 2,096,714. Oct. 26, 1937.

Sugar-Containing Pectin Mixture Obtained From Pomace to Which Has Been Added Definite Amounts of Invert Sugar to Inhibit Hydrolysis of Pectin During Extraction With Hot Acidulated Water—William A. Rooker, Martinsburg, W. Va., to National Fruit Products Co. Inc., Washington, D. C. No. 2,097,081. Oct. 26, 1937.

Beer and Similar Foam-Producing Liquids Filled Into Containers Against a Counter Gas Pressure From Supply Reservoir in Filling Machine—Robert J. Stewart and Wiltie I. Gledfelter to Crown Cork & Seal Co., Inc., Baltimore, Md. No. 2,097,107. Oct. 26, 1937.

Marshmallow Batch Divided Into Consumer Units After Being Made Brittle by Freezing—Edwin N. Campbell, Waukesha, Wis. No. 2,097,143. Oct. 26, 1937.

Fruit Simultaneously Cored and Sliced After Peeling on Same Machine—Edwin Earl Wilson, Sebastopol, Calif. No. 2,097,170. Oct. 26, 1937.

Spinach Given Heat Treatment at 160 deg. F. in Liquid Bath Preliminary to Putting in Cans and Subjecting to Second Heat Treatment Between 140 and 150 Deg. F. to Stabilize Green Coloring Preparatory to Retorting in the Cans—Byron E. Lesley, Oakland and James W. Shumate, San Francisco, Calif., to California Packing Corp., San Francisco, Calif. No. 2,097,198. Oct. 26, 1937.

Sugar Crystallized From Syrup in Circular Tanks Equipped With Agitator Consisting of Helical Coils of Tubing Mounted With Relatively Short Pitch on Shaft and Eccentrically Placed in Relation to Each Other—Harry E. Grill, Willoughby and Henry H. Feldstein to Kilby Manufacturing Co., Cleveland, Ohio. No. 2,097,208. Oct. 26, 1937.

Cocoa-Milk Beverage Stabilized Against Settling by Use of a Water Soluble Alginate Compound and Irish Moss.—Harland C. Green, Donald E. Clark, and Raymond P. Mann, San Diego and Bennett Preble, National City, Calif., to Kelco Co., Los Angeles, Calif. No. 2,097,224. Oct. 26, 1937.

Dairy Milk Products Given Heavier Body Through Addition of Water Soluble Alginate Compound and Water Soluble Gum—Harland C. Green, Donald E. Clark, and Raymond P. Mann, San Diego and Bennett Preble, National City, Calif., to Kelco Co., Los Angeles, Calif. No. 2,097,225. Oct. 26, 1937.

Cocoa-Milk Beverage and Ice Cream Mix Powders Given Body-Forming Properties Through Use of Soluble Alginate Compound or Alginic Acid—Howard J. Lucas, Pasadena, Calif., to Kelco Co., Los Angeles, Calif. Nos. 2,097,227, 2,097,228, 2,097,230, and 2,097,231. Oct. 26, 1937.

Ice Cream Given Heavier Body Qualities Through Addition of Water Soluble Alginate and a Water Soluble Ortho Phosphate—Howard J. Lucas, Pasadena, Calif., and Harland C. Green, Pasadena, Calif., to Kelco Co., Los Angeles, Calif. No. 2,097,229. Oct. 26, 1937.

Yeast Grown in Nutrient Solutions to Which Equal Quantities of Sugar are Added Over 20 Time Intervals Varying in Length From 15 to 50 Min.—Edmund Leith Kitzmeyer, Bloomfield, N. J. No. 2,097,292. Oct. 26, 1937.

Pepper Bleached by Dissolving Oleoresin in an Organic Peroxide and Heating—Lloyd A. Hall, Chicago, Ill., to The Griffith Laboratories Inc., Chicago, Ill. No. 2,097,405. Oct. 26, 1937.

Margarine Freed From Excess Water and Given Further Treating and Mixing by Being Forced Through a Collar of Frustro-Conical Shape Under Pressure from Helical-Screw—Jacob Schaub, Westfield, N. J., to Best Foods Inc., New York, N. Y. No. 2,097,423. Oct. 26, 1937.

Fruits Prepared for Pitting and Peeling by Being Frozen Through to Regions Surrounding Core or Pit and Subsequently Thawed on Surface to Permit Removal of Skin—Robert B. Taylor, Knoxville, Tenn. No. 2,097,479. Nov. 2, 1937.

Oils and Fats Protected Against Rancidity Through the Addition of Pure Catalase or Ripened Cheese—Mayne R. Coe, Washington, D. C., to the Public of the U. S. of America. No. 2,097,516. Nov. 2, 1937.

Starch Separated from Corn Gloten and Starch Mixtures by Keeping Amount of Water Used at Minimum and Making Use of High Gravity Gluten Obtained from Primary Separation—Albert Peltzer, Palo Alto, Calif., to Marco Centrifugal Separator Co., Ltd., San Francisco, Calif. No. 2,097,531. Nov. 2, 1937.

Green Coffee Berries Ground and Particles Freed from Static Charges Preliminary to Roasting in Heated Air—Sam Everett Finley one-third to Robert D. Kneale, Atlanta, Ga. No. 2,097,591. Nov. 2, 1937.